

**Computer Engineering Department , Indus Institute of Engineering & Technology, Indus University**

**Program - B. Tech (Computer Engineering)**

**SEMESTER - I**

| Sr. No. |        | Name of the subject     | Credit | Teaching Scheme |      |     |           | Evaluation Scheme |     |           |     |       | Category |
|---------|--------|-------------------------|--------|-----------------|------|-----|-----------|-------------------|-----|-----------|-----|-------|----------|
|         |        |                         |        | (per week)      |      |     |           | Theory            |     | Practical |     | Total |          |
|         |        |                         |        |                 |      |     |           | CIE               | ESE | CIE       | ESE | Marks |          |
|         |        |                         |        | Th.             | Tut. | Pr. | Tot (hr.) | Th.               | Th. | Pr.       | Pr. |       |          |
| 1       | MA0111 | Calculus                | 4      | 3               | 1    | 0   | 4         | 60                | 40  | 0         | 0   | 100   | BS       |
| 2       | CH0011 | Engineering Chemistry   | 4      | 3               | 0    | 2   | 5         | 60                | 40  | 60        | 40  | 200   | BS       |
| 3       | EN0111 | Technical Communication | 2      | 1               | 0    | 2   | 3         | 60                | 40  | 60        | 40  | 200   | HS       |
| 4       |        | <i>Open Elective 1</i>  | 3      | 3               | 0    | 0   | 3         | 60                | 40  | 0         | 0   | 100   | OE       |
| 5       | ME0019 | Engineering Graphics    | 3      | 1               | 0    | 4   | 5         | 60                | 40  | 60        | 40  | 200   | ES       |
| 6       | CV0004 | Environmental Science   | 2      | 2               | 0    | 0   | 2         | 60                | 40  | 0         | 0   | 100   | ES       |
| 7       |        | <i>Open Elective 2</i>  | 3      | 3               | 0    | 0   | 3         | 60                | 40  | 0         | 0   | 100   | OE       |
| 8       |        | Indian Knowledge System | 3      | 3               | 0    | 0   | 3         | 100               | 0   | 0         | 0   | 100   | VA       |
|         |        | Total                   | 24     | 19              | 1    | 8   | 28        | 520               | 280 | 180       | 120 | 1100  |          |

**SEMESTER - II**

| Sr. No. |        | Name of the subject                          | Credit | Teaching Scheme |      |     |           | Evaluation Scheme |     |           |     |       | Segment |
|---------|--------|----------------------------------------------|--------|-----------------|------|-----|-----------|-------------------|-----|-----------|-----|-------|---------|
|         |        |                                              |        | (per week)      |      |     |           | Theory            |     | Practical |     | Total |         |
|         |        |                                              |        |                 |      |     |           | CIE               | ESE | CIE       | ESE | Marks |         |
|         |        |                                              |        | Th.             | Tut. | Pr. | Tot (hr.) | Th.               | Th. | Pr.       | Pr. |       |         |
| 1       | MA0211 | Differential Equations & Linear Algebra      | 4      | 3               | 1    | 0   | 4         | 60                | 40  | 0         | 0   | 100   | BS      |
| 2       | PH0011 | Engineering Physics                          | 4      | 3               | 0    | 2   | 5         | 60                | 40  | 60        | 40  | 200   | BS      |
| 3       | EN0211 | Business Communication & Presentation Skills | 2      | 1               | 0    | 2   | 3         | 60                | 40  | 60        | 40  | 200   | HS      |
| 4       |        | <i>Open Elective 3</i>                       | 3      | 3               | 0    | 0   | 3         | 60                | 40  | 0         | 0   | 100   | OE      |
| 5       | ME0117 | Workshop Practice                            | 2      | 0               | 0    | 4   | 4         | 0                 | 0   | 60        | 40  | 100   | ES      |
| 6       | CE0216 | Programming for Problem Solving              | 4      | 3               | 0    | 2   | 5         | 60                | 40  | 60        | 40  | 200   | ES      |
|         |        | Indian Science Technology                    | 1      | 1               | 0    | 0   | 0         | 100               | 0   | 0         | 0   | 100   | VA      |
|         |        | Total                                        | 20     | 14              | 1    | 10  | 24        | 400               | 200 | 240       | 160 | 1000  |         |

**SEMESTER - III**

| Sr. No. |        | Name of the subject                         | Credit | Teaching Scheme |      |     |             | Evaluation Scheme |     |           |     |       | Segment |
|---------|--------|---------------------------------------------|--------|-----------------|------|-----|-------------|-------------------|-----|-----------|-----|-------|---------|
|         |        |                                             |        | (per week)      |      |     |             | Theory            |     | Practical |     | Total |         |
|         |        |                                             |        |                 |      |     |             | CIE               | ESE | CIE       | ESE | Marks |         |
|         |        |                                             |        | Th.             | Tut. | Pr. | Total (hr.) | Th.               | Th. | Pr.       | Pr. |       |         |
| 1       | MA0311 | Probability, Statistics & Numerical Methods | 4      | 3               | 1    | 0   | 4           | 60                | 40  | 0         | 0   | 100   | BS      |
| 2       | CE0320 | Computer Organization & Architecture        | 3      | 3               | 0    | 0   | 3           | 60                | 40  | 0         | 0   | 100   | Core    |
| 3       | EC0319 | Digital Electronics                         | 4      | 3               | 0    | 2   | 5           | 60                | 40  | 60        | 40  | 200   | ES      |
| 4       | CE0316 | Object Oriented concepts with UML           | 4      | 3               | 0    | 2   | 5           | 60                | 40  | 60        | 40  | 200   | Core    |
| 5       | CE0317 | Database Management System                  | 4      | 3               | 0    | 2   | 5           | 60                | 40  | 60        | 40  | 200   | Core    |
| 6       | SS0301 | Human Values and Professional Ethics        | 2      | 2               | 0    | 0   | 2           | 100               | 0   | 0         | 0   | 100   | HS      |
| 7       | CE0318 | Internship Credit /Online courses/ MOOC     | 2      | 0               | 0    | 0   | 0           | 0                 | 0   | 100       | 0   | 100   | IC      |
|         |        | TOTAL                                       | 23     | 17              | 1    | 6   | 24          | 400               | 200 | 280       | 120 | 1000  |         |

| SEMESTER - IV |        |                             |        |                 |      |     |               |                   |     |           |     |       |         |  |  |  |  |
|---------------|--------|-----------------------------|--------|-----------------|------|-----|---------------|-------------------|-----|-----------|-----|-------|---------|--|--|--|--|
| Sr. No.       |        | Name of the subject         | Credit | Teaching Scheme |      |     |               | Evaluation Scheme |     |           |     |       | Segment |  |  |  |  |
|               |        |                             |        | (per week)      |      |     |               | Theory            |     | Practical |     | Total |         |  |  |  |  |
|               |        |                             |        |                 |      |     |               | CIE               | ESE | CIE       | ESE | Marks |         |  |  |  |  |
|               |        |                             |        | Th.             | Tut. | Pr. | Tot.<br>(hr.) | Th.               | Th. | Pr.       | Pr. |       |         |  |  |  |  |
| 1             | CE0425 | ICT Tools and Technology    | 2      | 0               | 1    | 2   | 3             | 0                 | 0   | 100       | 0   | 100   | ES      |  |  |  |  |
| 2             | CE0417 | Data Structure & Algorithms | 4      | 3               | 0    | 2   | 5             | 60                | 40  | 60        | 40  | 200   | Core    |  |  |  |  |
| 3             | CE0418 | Operating System            | 4      | 3               | 0    | 2   | 5             | 60                | 40  | 60        | 40  | 200   | Core    |  |  |  |  |
| 4             | BB0311 | Management for Engineers    | 2      | 2               | 0    | 0   | 2             | 60                | 40  | 0         | 0   | 100   | HS      |  |  |  |  |
| 5             | CE0421 | Core Java Programming       | 4      | 3               | 0    | 2   | 5             | 60                | 40  | 60        | 40  | 200   | Core    |  |  |  |  |
|               |        | <i>Open Elective 4</i>      | 3      | 3               | 0    | 0   | 3             | 60                | 40  | 0         | 0   | 100   | OE      |  |  |  |  |
| 6             |        | <i>Open Elective 5</i>      | 3      | 3               | 0    | 0   | 3             | 60                | 40  | 0         | 0   | 100   | OE      |  |  |  |  |
|               |        | TOTAL                       | 22     | 17              | 1    | 8   | 26            | 360               | 240 | 280       | 120 | 1000  |         |  |  |  |  |



**SEMESTER - V**

| Sr. No. |        | Name of the subject                     | Credit | Teaching Scheme |      |     |           | Evaluation Scheme |     |           |     |       | Segment |
|---------|--------|-----------------------------------------|--------|-----------------|------|-----|-----------|-------------------|-----|-----------|-----|-------|---------|
|         |        |                                         |        | (per week)      |      |     |           | Theory            |     | Practical |     | Total |         |
|         |        |                                         |        |                 |      |     |           | CIE               | ESE | CIE       | ESE | Marks |         |
|         |        |                                         |        | Th.             | Tut. | Pr. | Tot (hr.) | Th.               | Th. | Pr.       | Pr. |       |         |
| 1       | CE0516 | Design and Analysis of Algorithms       | 4      | 3               | 0    | 2   | 5         | 60                | 40  | 60        | 40  | 200   | Core    |
| 2       | CE0517 | Microprocessing and Interfacing         | 4      | 3               | 0    | 2   | 5         | 60                | 40  | 60        | 40  | 200   | ES      |
| 3       | CE0518 | Computer Networks                       | 4      | 3               | 0    | 2   | 5         | 60                | 40  | 60        | 40  | 200   | Core    |
| 4       |        | <i>Open Elective 6</i>                  | 3      | 3               | 0    | 0   | 3         | 60                | 40  | 0         | 0   | 100   | OE      |
| 5       | CE0525 | Programming for Scientific Computing    | 4      | 3               | 0    | 2   | 5         | 60                | 40  | 60        | 40  | 200   | Core    |
| 6       | CE0522 | Web Technology                          | 4      | 3               | 0    | 2   | 5         | 60                | 40  | 60        | 40  | 200   | Core    |
| 7       | CE0523 | Internship Credit /Online courses/ MOOC | 2      | 0               | 0    | 0   | 0         | 0                 | 0   | 100       | 0   | 100   | IC      |
|         |        | Total                                   | 25     | 18              | 0    | 10  | 28        | 360               | 240 | 400       | 200 | 1200  |         |

| SEMESTER - VI |        |                                                  |        |                 |      |     |             |                   |     |           |     |       |         |
|---------------|--------|--------------------------------------------------|--------|-----------------|------|-----|-------------|-------------------|-----|-----------|-----|-------|---------|
| Sr. No.       |        | Name of the subject                              | Credit | Teaching Scheme |      |     |             | Evaluation Scheme |     |           |     |       | Segment |
|               |        |                                                  |        | (per week)      |      |     |             | Theory            |     | Practical |     | Total |         |
|               |        |                                                  |        |                 |      |     |             | CIE               | ESE | CIE       | ESE | Marks |         |
|               |        |                                                  |        | Th.             | Tut. | Pr. | Total (hr.) | Th.               | Th. | Pr.       | Pr. |       |         |
| 1             | CE0616 | Software Engineering with UML                    | 4      | 3               | 0    | 2   | 5           | 60                | 40  | 60        | 40  | 200   | Core    |
| 2             | CE0617 | Theory of Computation                            | 4      | 4               | 0    | 0   | 4           | 60                | 40  | 0         | 0   | 100   | Core    |
| 3             | CE0630 | Data Science                                     | 4      | 3               | 0    | 2   | 5           | 60                | 40  | 60        | 40  | 200   | PE      |
|               | CE0631 | Information Retrieval                            |        |                 |      |     |             |                   |     |           |     |       |         |
|               | CE0632 | Web Data Management                              |        |                 |      |     |             |                   |     |           |     |       |         |
| 4             | CE0618 | Advanced Java Technology                         | 4      | 3               | 0    | 2   | 5           | 60                | 40  | 60        | 40  | 200   | PE      |
|               | CE0619 | Advance .Net Framework                           |        |                 |      |     |             |                   |     |           |     |       |         |
|               | CE0628 | Mobile Application Development ( Android & iOS ) |        |                 |      |     |             |                   |     |           |     |       |         |
| 6             |        |                                                  |        |                 |      |     |             |                   |     |           |     |       |         |
| 5             | CE0633 | Distributed Systems                              | 4      | 3               | 0    | 2   | 5           | 60                | 40  | 60        | 40  | 200   | PE      |
|               | CE0634 | Cryptography & Network Security                  |        |                 |      |     |             |                   |     |           |     |       |         |
|               | CE0629 | Data Compression                                 |        |                 |      |     |             |                   |     |           |     |       |         |
| 6             |        | <i>Open Elective 7</i>                           | 3      | 3               | 0    | 0   | 3           | 60                | 40  | 0         | 0   | 100   | OE      |
|               |        | <i>Research Guided Seminar</i>                   | 2      | 0               | 2    | 0   | 2           | 100               | 0   | 0         | 0   | 0     | HS      |
| 7             | CE0622 | Internet of Things                               | 4      | 3               | 0    | 2   | 5           | 60                | 40  | 60        | 40  | 200   | ES      |
|               |        | TOTAL                                            | 29     | 22              | 2    | 10  | 34          | 520               | 280 | 300       | 200 | 1200  |         |

**SEMESTER - VII**

| Sr. No. |        | Name of the subject                     | Credit | Teaching Scheme |      |     |             | Evaluation Scheme |     |           |     |       | Segment         |
|---------|--------|-----------------------------------------|--------|-----------------|------|-----|-------------|-------------------|-----|-----------|-----|-------|-----------------|
|         |        |                                         |        | (per week)      |      |     |             | Theory            |     | Practical |     | Total |                 |
|         |        |                                         |        |                 |      |     |             | CIE               | ESE | CIE       | ESE | Marks |                 |
|         |        |                                         |        | Th.             | Tut. | Pr. | Total (hr.) | Th.               | Th. | Pr.       | Pr. |       |                 |
| 1       | CE0716 | Data Warehouse & Mining                 | 4      | 3               | 0    | 2   | 5           | 60                | 40  | 60        | 40  | 200   | PE              |
|         | CE0718 | Advance Computer Architecture           |        |                 |      |     |             |                   |     |           |     |       |                 |
|         | CE0721 | Advance Operating System                |        |                 |      |     |             |                   |     |           |     |       |                 |
| 2       | CE0717 | Compiler Design                         | 4      | 3               | 1    | 0   | 4           | 60                | 40  | 0         | 0   | 100   | Core            |
| 3       |        | <i>Open Elective 8</i>                  | 3      | 2               | 0    | 2   | 4           | 0                 | 0   | 0         | 0   | 0     | OE              |
|         |        | Cyber Security                          |        |                 |      |     |             |                   |     |           |     |       |                 |
|         |        | Block Chaining                          |        |                 |      |     |             |                   |     |           |     |       |                 |
|         |        | Soft Computing                          |        |                 |      |     |             |                   |     |           |     |       |                 |
|         |        | Embedded System                         |        |                 |      |     |             |                   |     |           |     |       |                 |
| 4       | CE0728 | * Natural Language Processing (4+0+0)   | 4      | 3               | 0    | 2   | 0           | 60                | 40  | 60        | 40  | 200   | PE              |
|         | CE0730 | Human Computer Interface                |        |                 |      |     |             |                   |     |           |     |       |                 |
|         | CE0732 | Computer Vision and Applications        |        |                 |      |     |             |                   |     |           |     |       |                 |
|         | CE0723 | Cloud Computing                         |        |                 |      |     |             |                   |     |           |     |       |                 |
| 5       | CE0727 | Software Group Project-I                | 2      | 0               | 1    | 2   | 3           | 0                 | 0   | 100       | 0   | 0     | PRJ             |
|         |        | <i>Open Elective 9</i>                  | 3      | 0               | 0    | 0   | 3           | 60                | 40  | 0         | 0   | 100   | OE              |
| 6       | CE0726 | Internship Credit /Online courses/ MOOC | 2      | 0               | 0    | 0   | 0           | 0                 | 0   | 100       | 0   | 100   | IC              |
| 7       | IT0501 | Computer Graphics                       |        |                 |      |     |             |                   |     |           |     |       | Extra Credit PE |
|         | IT0701 | Artificial Intelligence                 |        |                 |      |     |             |                   |     |           |     |       |                 |
|         | IT0602 | Big Data Analytics                      |        |                 |      |     |             |                   |     |           |     |       |                 |
|         | CS0602 | Data Preparation & Analysis             |        |                 |      |     |             |                   |     |           |     |       |                 |
|         | CS0501 | Advance Microprocessor                  |        |                 |      |     |             |                   |     |           |     |       |                 |
|         | CS0701 | Machine Learning                        |        |                 |      |     |             |                   |     |           |     |       |                 |
|         | CE0716 | Data Warehouse & Mining                 |        |                 |      |     |             |                   |     |           |     |       |                 |
|         | CE0617 | Theory of Computation                   |        |                 |      |     |             |                   |     |           |     |       |                 |
|         | CE0717 | Compiler Design                         |        |                 |      |     |             |                   |     |           |     |       |                 |
|         | CE0517 | Microprocessing and Interfacing         |        |                 |      |     |             |                   |     |           |     |       |                 |
|         |        | Total                                   | 22     | 11              | 2    | 8   | 19          | 240               | 160 | 320       | 80  | 700   |                 |

**SEMESTER - VIII**

| Sr. No. |        | Name of the subject | Credit | Teaching Scheme |      |     |             | Evaluation Scheme |     |           |     |       | Segment |
|---------|--------|---------------------|--------|-----------------|------|-----|-------------|-------------------|-----|-----------|-----|-------|---------|
|         |        |                     |        | (per week)      |      |     |             | Theory            |     | Practical |     | Total |         |
|         |        |                     |        |                 |      |     |             | CIE               | ESE | CIE       | ESE | Marks |         |
|         |        |                     |        | Th.             | Tut. | Pr. | Total (hr.) | Th.               | Th. | Pr.       | Pr. |       |         |
| 1       | CE0816 | Project             | 14     | 0               | 0    | 28  | 28          | 0                 | 0   | 60        | 40  | 100   | PRJ     |
|         |        | Total               | 14     | 0               | 0    | 28  | 28          | 0                 | 0   | 60        | 40  | 100   |         |

**Computer Engineering Department , Indus Institute of Engineering & Technology, Indus University**  
**Program - B. Tech (Computer Engineering/Computer Science & Engineering/Information Technology)**

| SEMESTER - I |        |                         |        |                 |      |     |           |                   |     |           |     |       |          |
|--------------|--------|-------------------------|--------|-----------------|------|-----|-----------|-------------------|-----|-----------|-----|-------|----------|
| Sr. No.      |        | Name of the subject     | Credit | Teaching Scheme |      |     |           | Evaluation Scheme |     |           |     |       | Category |
|              |        |                         |        | (per week)      |      |     |           | Theory            |     | Practical |     | Total |          |
|              |        |                         |        |                 |      |     |           | CIE               | ESE | CIE       | ESE | Marks |          |
|              |        |                         |        | Th.             | Tut. | Pr. | Tot (hr.) | Th.               | Th. | Pr.       | Pr. |       |          |
| 1            | MA0111 | Calculus                | 4      | 3               | 1    | 0   | 4         | 60                | 40  | 0         | 0   | 100   | BS       |
| 2            | CH0011 | Engineering Chemistry   | 4      | 3               | 0    | 2   | 5         | 60                | 40  | 60        | 40  | 200   | BS       |
| 3            | EN0111 | Technical Communication | 2      | 1               | 0    | 2   | 3         | 60                | 40  | 60        | 40  | 200   | HS       |
| 4            |        | <i>Open Elective 1</i>  | 3      | 3               | 0    | 0   | 3         | 60                | 40  | 0         | 0   | 100   | OE       |
| 5            | ME0019 | Engineering Graphics    | 3      | 1               | 0    | 4   | 5         | 60                | 40  | 60        | 40  | 200   | ES       |
| 6            | CV0004 | Environmental Science   | 2      | 2               | 0    | 0   | 2         | 60                | 40  | 0         | 0   | 100   | ES       |
| 8            |        | Indian Knowledge System | 3      | 3               | 0    | 0   | 3         | 100               | 0   | 0         | 0   | 100   | VA       |
| 7            |        | <i>Open Elective 2</i>  | 3      | 3               | 0    | 0   | 3         | 60                | 40  | 0         | 0   | 100   | OE       |
|              |        | Total                   | 24     | 19              | 1    | 8   | 28        | 520               | 280 | 180       | 120 | 1100  |          |

|                                    |                 |                  |                |                                      |                                         |                                                     |                                                        |              |
|------------------------------------|-----------------|------------------|----------------|--------------------------------------|-----------------------------------------|-----------------------------------------------------|--------------------------------------------------------|--------------|
| <b>Subject: Calculus</b>           |                 |                  |                |                                      |                                         |                                                     |                                                        |              |
| <b>Program: B. Tech. CE/CSE/IT</b> |                 |                  |                | <b>Subject Code:MA0111</b>           |                                         |                                                     | <b>Semester: I</b>                                     |              |
| <b>Teaching Scheme</b>             |                 |                  |                | <b>Examination Evaluation Scheme</b> |                                         |                                                     |                                                        |              |
|                                    |                 |                  |                | <b>University Theory Examination</b> | <b>University Practical Examination</b> | <b>Continuous Internal Evaluation (CIE)- Theory</b> | <b>Continuous Internal Evaluation (CIE)- Practical</b> | <b>Total</b> |
| <b>Lecture</b>                     | <b>Tutorial</b> | <b>Practical</b> | <b>Credits</b> |                                      |                                         |                                                     |                                                        |              |
| <b>3</b>                           | <b>1</b>        | <b>0</b>         | <b>4</b>       | <b>40</b>                            | <b>0</b>                                | <b>60</b>                                           | <b>0</b>                                               | <b>100</b>   |

|            | <b>CONTENT</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                 |
|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| <b>U 1</b> | <b>Partial derivatives and its applications</b><br>Function of several variables: Limits, continuity, Partial Differentiation-variable treated as constant, total derivative, partial differentiation of composite functions, and differentiation of an Implicit Function.<br>Applications of partial derivatives: Euler's Theorem, Jacobian, Maxima and Minima of Functions of two Variables- with and without constraints, Lagrange's Method of Undetermined Multipliers | <b>11 hours</b> |
| <b>U 2</b> | <b>Multiple Integral</b><br>Reduction formula, Curve tracing - Cartesian and polar, Double Integral, Change of order, Change of variables, Triple integral                                                                                                                                                                                                                                                                                                                 | <b>11 hours</b> |
| <b>U 3</b> | <b>Vector Differential Calculus</b><br>Vector Differentiation, Directional Derivative, Gradient of a Scalar Function and Conservative Field, Divergence and Curl, Related Properties of Gradient, Sums of Divergence and Curl<br>Curvilinear coordinate system, Cartesian, Spherical and Cylindrical coordinate system                                                                                                                                                     | <b>12 hours</b> |
| <b>U 4</b> | <b>Vector Integral Calculus</b><br>Vector Integration: Integration of a Vector Function of a Scalar Argument<br>Line Integrals: application to find work done, Potential, Conservative Field and Area<br>Introduction to Surface Integrals, Volume Integrals, Green's Theorem in Plane, Stokes' Theorem, Gauss Divergence Theorem                                                                                                                                          | <b>11 hours</b> |

**Text Book:** B. V. Ramana, "Higher Engineering Mathematics", Tata McGraw Hill.

**Reference Books:**

1. Erwin Kreyszig, "Advanced Engineering Mathematics" (8th Edition), Wiley Eastern Ltd., New Delhi.
2. Dr. B.S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, New Delhi
3. Murray Spiegel, "Advanced Mathematics for Engineering & Science: Schaum's Outline Series", Tata McGraw Hill Publication
4. Merel C Potter, J.L. Goldberg, "Advanced Engineering Mathematics" (3rd Edition), Oxford India Publication.

|                                       |                 |                  |                |                                      |                                         |                                                     |                                                        |              |
|---------------------------------------|-----------------|------------------|----------------|--------------------------------------|-----------------------------------------|-----------------------------------------------------|--------------------------------------------------------|--------------|
| <b>Subject: Engineering Chemistry</b> |                 |                  |                |                                      |                                         |                                                     |                                                        |              |
| <b>Program: B. Tech CE/CSE/IT</b>     |                 |                  |                | <b>Subject Code: CH0011</b>          |                                         |                                                     | <b>Semester : I</b>                                    |              |
| <b>Teaching Scheme</b>                |                 |                  |                | <b>Examination Evaluation Scheme</b> |                                         |                                                     |                                                        |              |
| <b>Lecture</b>                        | <b>Tutorial</b> | <b>Practical</b> | <b>Credits</b> | <b>University Theory Examination</b> | <b>University Practical Examination</b> | <b>Continuous Internal Evaluation (CIE)- Theory</b> | <b>Continuous Internal Evaluation (CIE)- Practical</b> | <b>Total</b> |
| <b>3</b>                              | <b>0</b>        | <b>2</b>         | <b>4</b>       | <b>40</b>                            | <b>40</b>                               | <b>60</b>                                           | <b>60</b>                                              | <b>200</b>   |

### Course Objectives:

1. To describe the various basic concepts of chemistry and green chemistry with direct application to the built environment.
2. To describe the basics of energy system, electrochemistry, surface chemistry and their practical applications.
3. To discuss the understanding of various smart materials, cement, ceramics materials and their applications in different engineering fields.
4. To apply consciousness about the quality of water for industrial process, problems and troubleshooting techniques
5. To apply knowledge about the corrosion for industrial process, problems and its prevention techniques

## CONTENTS

### UNIT-I

**[12 hours]**

#### **General Chemistry**

Introduction to Chemical Sciences, Basics includes: Periodicity, Types of reactions, various acid base concepts, Electrochemistry, Electrochemical Cell, Galvanic Cell, Electrolytic Cell, Types of electrodes, Single electrode potentials, Reference Electrodes, Standard Hydrogen Electrode (SHE), Standard Calomel Electrode (SCE), Glass Electrode, Quinhydrone Electrode, Nernst equation, Conductance, Cell constant and its determination, Conductometric titrations, Numerical

#### **Green Chemistry**

Introduction, Principles & Concepts of Green Chemistry, Importance of green synthesis, methods for green synthesis, application of green synthesis, Greenhouse concepts

## UNIT-II

[12 hours]

### **Energy System**

Introduction, classification of fuel, characteristics of good fuel, determination of calorific value of solid/liquid fuel using bomb calorimeter, numerical problems. Power alcohol, unleaded petrol and biodiesel, Introduction, classification - primary, secondary and reserve batteries. Construction, working and applications of Li-ion batteries , Overview of Oil and lubricants

### **Catalyst and Surface Chemistry**

Catalysis: Types of catalysis, Positive & Negative catalysis, Homogeneous and Heterogeneous catalysis, Characteristics of Catalytic action, Poisoning of catalysis, Promoters, Auto Catalysis, Acid-Base Catalysis, Theories of Catalysis process, Catalysis of metal salts Criteria for choosing the catalyst for industrial process, Industrial Applications of Catalysts.

Adsorption: Introduction, Terminology, Factors affecting the adsorption of Gases by Solids, Types of adsorption, adsorption isotherm: Freundlich adsorption isotherm, Langmuir adsorption Isotherm, Determination of surface area by BET method, Application of adsorption.

## UNIT-III

[11 hours]

### **Advance Engineering Materials and its Applications**

Liquid Crystals: Introduction, classification and applications, Organic Electronic Materials: Introduction, types and applications, Chemical Sensors: Introduction, types and applications, Ionic Liquids: Introduction and applications, Chromic Materials: Introduction, types and applications, Synthesis and application of Nano materials.

### **Cement & Ceramic Materials**

**Cement:** Introduction, Cement and its classification, Manufacture, chemical composition ,setting and hardening , I.S.I specification , physical properties of Portland cement, Lime and Plaster of Paris.

**Ceramics and Refractories:** Introduction, Refractories, Properties of Refractories, Some important high refractory materials, Glass, Porcelain.

## UNIT-IV

[13 hours]

### **Water Chemistry:**



Sources of water, Soft Water & Hard Water, Types of hardness, Units of hardness measurement, specification of drinking water, Impurities in water, Disadvantages of hard water, Determination of water hardness by EDTA method, Alkalinity of water and its significance, Significance and determination of COD and BOD. Boiler feed water, Scale and sludge formation in boilers and pipes etc , Boiler Corrosion, Water softening through Soda lime process, Zeolite Process & Ion-exchange Process, Characteristics of Potable water, Sources and quality of drinking water, Treatment of water for domestic use: Filtration, Coagulation, Sedimentation and Disinfection, Desalination through Electro Dialysis & Reverse Osmosis, Numerical problems.

### **Corrosion and its prevention**

Definition and types of corrosion water line, pitting, stress, erosion and soil corrosion, Caustic embrittlement, Factors affecting on corrosion (Metallic and Environmental), Pourbaix diagram, Protective measures to control Corrosion, Sacrificial anode and Cathode process for corrosion control., Dry (chemical corrosion), Wet (Electrochemical corrosion) and its mechanisms; Types of electrochemical corrosion, (differential aeration, galvanic, concentration cell.

### **Text Books:**

1. P.C. Jain, M. Jain, Engineering Chemistry 15<sup>th</sup> edition, Dhanpat Rai Publishing Company, New Delhi, 2005.ISBN8187433175
2. Shashi Chawla, Textbook of Engineering Chemistry, Dhanpat Rai Publishing Co.2004.ISBN9788126519880

### **Reference Books:**

1. Dara, S.S., Umare S.S.; A Text Book of Engineering Chemistry (Twelfth edition); S. Chand. Co. 2014, ISBN:8121903599.
2. P. Atkins, J.D. Paula, Physical Chemistry, Oxford University Press,2017, ISBN:9780198769866.
3. A. J. Mee, Physical Chemistry, 6th Ed. English Language Book Society and Heinemann Educational Books Ltd. London, 1962.ISBN: 0435665766
4. Douglas A. Skoog, Donald M. West, Fundamentals of Analytical Chemistry, Cengage Learning, Ninth Edition, 2014.ISBN:9780495558347
5. Puri B. R., Sharma L. R., Pathania M.S; Principles of Physical Chemistry; Vishal Publishing Co. (46th Edition), 2013.ISBN:9789382956013.
6. Arthur E. Morris, Gordon Geiger and H. Alan Fine, Handbook on Material & Energy Balance Calculations in Material Processing, Third Edition, 2011. ISBN:9781118065655

### **Web Resources:**

1. **General chemistry Electrochemistry**  
([http://www.cdeep.iitb.ac.in/webpage\\_data/nptel/Core%20Science/](http://www.cdeep.iitb.ac.in/webpage_data/nptel/Core%20Science/))

Engineering%20Chemistry%201/Course\_home\_Lec22.html,  
[http://www.cdeep.iitb.ac.in/webpage\\_data/nptel/Core%20Science/Engineering%20Chemistry%201/Course\\_home\\_Lec24.html](http://www.cdeep.iitb.ac.in/webpage_data/nptel/Core%20Science/Engineering%20Chemistry%201/Course_home_Lec24.html) )

2. **Green Chemistry** (<https://www.epa.gov/greenchemistry>)

3. **Energy System** (<https://www.toppr.com/guides/chemistry/combustion-and-fuel/introduction-to-fuel-and-fuel-efficiency/>,<https://nptel.ac.in/courses/121106014/31>)

4. **Catalyst and Surface Chemistry**

([http://www.cdeep.iitb.ac.in/webpage\\_data/nptel/Core%20Science/Engineering%20Chemistry%201/Course\\_home\\_Lec6.html](http://www.cdeep.iitb.ac.in/webpage_data/nptel/Core%20Science/Engineering%20Chemistry%201/Course_home_Lec6.html))

5. **Advance Engineering Materials and its Applications**

(<https://www.youtube.com/watch?v=dm0bUBy-Utk>,  
<https://www.youtube.com/watch?v=qUEbxTkPIWI>)

6. **Cement & Ceramic Materials**

(<https://www.youtube.com/watch?v=qk9P3e0l2IE>)

7. **Water Treatment** (<https://www.youtube.com/watch?v=O-MRC0dskHg>,<https://www.youtube.com/watch?v=SvCIfcovf9k>)

8. **Corrosion**

([http://www.cdeep.iitb.ac.in/webpage\\_data/nptel/Core%20Science/Engineering%20Chemistry%201/Course\\_home\\_Lec25.html](http://www.cdeep.iitb.ac.in/webpage_data/nptel/Core%20Science/Engineering%20Chemistry%201/Course_home_Lec25.html))

| Subject: Technical Communication |          |           |         |                               |                                  |                                              |                                                 |       |
|----------------------------------|----------|-----------|---------|-------------------------------|----------------------------------|----------------------------------------------|-------------------------------------------------|-------|
| Program: B. Tech CE/CSE/IT       |          |           |         | Subject Code: EN0111          |                                  |                                              | Semester: I                                     |       |
| Teaching Scheme                  |          |           |         | Examination Evaluation Scheme |                                  |                                              |                                                 | Total |
| Lecture                          | Tutorial | Practical | Credits | University Theory Examination | University Practical Examination | Continuous Internal Evaluation (CIE)- Theory | Continuous Internal Evaluation (CIE)- Practical |       |
| 1                                | 2        | 0         | 3       | 40                            | 0                                | 60                                           | 0                                               | 100   |

### Course Objectives:

1. To help students develop comprehension and soft skills
2. To increase student's ability to improve and utilize the technical skills necessary for reading and writing.
3. To improve students' communication skills in both technical and professional contexts.

## CONTENT

### Unit 1: Listening:

- Diagnostic Test(Stratification)
- Icebreaking - Switch Introduction
- Icebreaking - Past, Present and Future
- Listening/ Cloze Test 1
- Listening/ Ted Talk
- Listening/ Josh Talk
- Listening/Celebrity Interviews
- Listening/ News Hour debates

### Unit 2: Speaking

- Introduction and Polite Conversations
- Situational Dialogues
- Role Play
- Body Language

- Group Discussion
- JAM Sessions

### **Unit 3: Language Focus**

- Teaching Remedial Grammar through Poem
- Vocabulary Building/Describing Words
- Movie Viewing and Discussion
- Book and Movie Adaptation
- Match Commentary and Review

### **Unit 4: Reading Skills**

- Reading/Reading with Vocalic
- Read and Tweet
- Skimming/Scanning the Newspapers
- Reading/Play Enactment
- Reading/Short Stories
- 

### **Reference Books:**

1. English for Engineers and Technologists, Volumes 1 and 2, Department of Humanities and Social Sciences, Anna University, Chennai, Orient Longmans Publication, 2008.
2. Balasubramanyam, M and Anbalagan, G., Perform in English, Anuradha Publications, Kumbakonam, 2010.
3. Meenakshi Raman and Sangeetha Sharma, Technical Communication: Principles and Practice, Oxford University Press, New Delhi, 2004.
4. KiranmaiDutt, P. et al., A Course on Communication Skills, Edition Foundation Books, New Delhi, 2007.
5. Ashraf Rizvi, M., Effective Technical Communication, Tata McGraw Hill Publication, New Delhi, 2008.
6. Geoffrey Leech, Jan Swartvik, 'A Communicative Grammar of English', ELBS – Longman.
7. Norman and Lewis, 'English Made Easy', Oxford Publication.
8. E- Writing: 21st –Century Tools for Effective Communication, Dianna Booher, Macmillan India Ltd., 2007, ISBN – 1403-93202-6
9. R. K Bansal, spoken English for India (Orient Longman, Madras, 1972.

## **Web resources/ MOOCs:**

### **1. Grammar Clauses:**

<https://www.khanacademy.org/humanities/grammar/syntax-sentences-and-clauses>

### **2. Parts of Speech Conjunctions & Prepositions:**

<https://www.khanacademy.org/humanities/grammar/parts-of-speech-the-preposition-and-the-conjunction>

**3. Nouns:** <https://www.khanacademy.org/humanities/grammar/parts-of-speech-the-noun>

**4. Verbs:** <https://www.khanacademy.org/humanities/grammar/parts-of-speech-the-verb>

**5. Pronouns:** <https://www.khanacademy.org/humanities/grammar/parts-of-speech-the-pronoun>

### **6. Adjectives & Adverbs:**

<https://www.khanacademy.org/humanities/grammar/parts-of-speech-the-modifier>

### **7. Syntax: Conventions of Standard English:**

<https://www.khanacademy.org/humanities/grammar/syntax-conventions-of-standard-english>

| Subject: Engineering Graphics (ES) |          |           |         |                               |                                  |                                             |                                                |             |
|------------------------------------|----------|-----------|---------|-------------------------------|----------------------------------|---------------------------------------------|------------------------------------------------|-------------|
| Program: B. Tech.<br>CE/CSE/IT     |          |           |         | Subject Code: ME0019          |                                  |                                             | Semester: I                                    |             |
| Teaching Scheme                    |          |           |         | Examination Evaluation Scheme |                                  |                                             |                                                |             |
| Lecture                            | Tutorial | Practical | Credits | University Theory Examination | University Practical Examination | Continuous Internal Evaluation (CIE) Theory | Continuous Internal Evaluation (CIE) Practical | Total Marks |
| 1                                  | 0        | 4         | 3       | 40                            | 40                               | 60                                          | 60                                             | 200         |

### Course Objectives:

1. The course is aimed at developing basic graphic skills.
2. Develop skills in preparation of basic drawings.
3. Skills in reading and interpretation of engineering drawings

## CONTENT

### UNIT-I

[04]

#### **Introduction to Engineering Graphics**

Principles of Engineering Graphics and their Significance – Drawing Instruments and their Use – Conventions in Drawing – Lettering – BIS Conventions- Dimensioning systems – polygons-types of lines

#### **Engineering Curves**

Classification and application of Engineering Curves, Construction of different methods of Ellipse, parabola and Hyperbola, construction of Conics, Cycloid Curves – Cycloid, Hypocycloid, Epicycloids, Involute and Spirals.

#### **Projections of Points and Lines**

Introduction to principal planes of projections, Projections of the points located in same quadrant and different quadrants, Projections of line with its inclination to one reference plane and with two reference planes. True length and inclination with the reference planes.

## UNIT-II

[04]

### **Projections of Planes**

Projections of planes (polygons, circle, and ellipse) with its inclination to one reference plane and with two reference planes, Concept of auxiliary plane method for projections of the plane.

### **Projections of Solids**

Classification of solids. Projections of solids (Cylinder, Cone, Pyramid, Prism) along with frustum of cone and pyramid with their inclinations to one reference plane and with two reference planes.

## UNIT-III

[04]

### **Orthographic and Sectional Orthographic Projections**

Fundamental of projection along with classification, Projections from the pictorial view of the object on the principal planes for view from front, top and sides using first angle projection method and third angle projection method, introduction of section of objects, full sectional view.

## UNIT-IV

[04]

### **Isometric Projections**

Isometric Scale, Conversion of orthographic views into isometric projection, isometric view or drawing.

### **Course Outcomes:**

After learning the course, the students should be able to:

1. Understand the conventions and the methods of engineering drawing.
2. Interpret engineering drawings using fundamental technical mathematics.
3. Construct basic and intermediate geometry. Improve their visualization skills so that they can apply these skills in developing new products.

### **Text Books:**

1. P. J. Shah, "A Text Book of Engineering Graphics"  
Publication: S. Chand.
2. A Text Book of Machine Drawing by P. J. Shah S.  
Chand & Company Ltd., New Delhi

### **Reference Books:**

1. N. D. Bhatt, "Elementary Engineering Drawing",  
Charotar Publishing House, Anand
2. P. D. Patel, "Engineering Graphics" Publication:  
Mahajan
3. A text book of Engineering Drawing by R. K. Dhawan,  
S. Chand & Company Ltd., New Delhi
4. A text book of Engineering Drawing by P. S. Gill, S. K.  
Kataria & sons, Delhi

### **Web Resources & MOOCs:**

1. <http://nptel.ac.in/courses/112103019/>
2. <https://onlinecourses.nptel.ac.in>

### **LIST OF PRACTICAL/DRAWING SHEETS**

1. Practice sheet (which includes dimensioning  
methods, different types of line, preparation of title  
block, Polygon)
2. Engineering curves – I (Ellipse, parabola and Hyperbola)
3. Engineering curves – II (Cycloid, Hypocycloid, Epicycloids,  
Involute, Spirals)
4. Projections of Points and Line
5. Projections of Line
6. Projections of Planes
7. Projections of Solids
8. Orthographic projection
9. Section Orthographic projection
10. Isometric projection



|                                       |                 |                  |                |                                      |                                         |                                                     |                                                        |              |
|---------------------------------------|-----------------|------------------|----------------|--------------------------------------|-----------------------------------------|-----------------------------------------------------|--------------------------------------------------------|--------------|
| <b>Subject: Environmental Science</b> |                 |                  |                |                                      |                                         |                                                     |                                                        |              |
| <b>Program: B. Tech. CE/CSE/IT</b>    |                 |                  |                | <b>Subject Code: CV0004</b>          |                                         |                                                     | <b>Semester: I</b>                                     |              |
| <b>Teaching Scheme</b>                |                 |                  |                | <b>Examination Evaluation Scheme</b> |                                         |                                                     |                                                        |              |
| <b>Lecture</b>                        | <b>Tutorial</b> | <b>Practical</b> | <b>Credits</b> | <b>University Theory Examination</b> | <b>University Practical Examination</b> | <b>Continuous Internal Evaluation (CIE)- Theory</b> | <b>Continuous Internal Evaluation (CIE)- Practical</b> | <b>Total</b> |
| <b>2</b>                              | <b>0</b>        | <b>0</b>         | <b>2</b>       | <b>40</b>                            | <b>-</b>                                | <b>60</b>                                           | <b>-</b>                                               | <b>100</b>   |

### Course Objective:

1. To get the real sense of environmental conservation aspects and making aware about the current trends towards environmental stability.

## CONTENT

### UNIT I

[7]

#### Concepts of Environmental Sciences:

**Environment:** Levels of organizations in environment, Structure and functions in an ecosystem;

**Biosphere:** Its Origin and distribution on land, in water and in air, Ecosystem and functioning of Ecosystem.

**Natural Resources** (Anubha Kaushik book): Renewable and Non-renewable Resources, Forests, water, minerals, Food and land (with example of one case study); Energy, Growing energy needs, energy sources (conventional and alternatives), State of Indian Environment.

**Biodiversity and its conservation** (Anubha Kaushik book): Biodiversity at global, national and local levels; India as a mega-diversity nation; Threats to biodiversity (biotic, abiotic stresses), and strategies for conservation

### UNIT-II

[7]

**Environmental Pollution:** Types of pollution- Air, water (including urban, rural, marine), soil, noise, thermal, nuclear, Solid Waste (Organic and Inorganic), Concept of clean Environment; Case Studies of

Indian Studies.

Introduction to man-made disasters ( Urban Flooding, Heatwave)

### **UNIT-III**

[8]

**Pollution prevention:** Management of pollution- Rural/Urban/Industrial waste management [with case study of any one type, e.g., power (thermal/nuclear), fertilizer, tannin, leather, chemical, sugar], Solid/Liquid waste management, disaster management.

**Environmental Monitoring:** Monitoring- Identification of environmental problem, tools for monitoring (remote sensing, GIS); Sampling strategies- Air, water, soil sampling techniques  
Technologies for Pollution Control: Bio-remediation, phytoremediation, bio-pesticides, bio-fertilizers;

**Legal issues:** Environmental legislation (Acts and issues involved), Environmental Protection Acts : (Swachh Bharat Abhiyan, state Action Plans)

Research and Policies relating to environmental Protection

### **UNIT-IV**

[8]

**Social Issues and the Environment:**

Concept of sustainability and Sustainable Development, environmental Sustainability Index, Environmental Ethics, Public awareness and people's participation, Green Business (Profitability in managing Environment)

#### **Course Outcomes:**

1. Understand and realize the multi-disciplinary nature of the environment, its components, and inter-relationship between man and environment.
2. Understand the relevance and importance of the natural resources in the sustenance of life on earth and living standard.
3. Comprehend the importance of ecosystem, biodiversity and natural bio geo chemical cycle.
4. To correlate the human population growth and its trend to the environmental degradation and develop the awareness about his/her role towards environmental protection and prevention.
5. Identify different types of environmental pollution and control measures.
6. To correlate the exploitation and utilization of conventional and non conventional resources.

### **Self-study:**

The self-study components will be declared at the commencement of semester. Around 10% of the questions will be asked from self-study contents.

### **Reference Books:**

1. Basics of Environmental Studies by Prof Dr N S Varandani ,2013  
Publisher: LAP - Lambert Academic Publishing , Germany
2. Environmental Studies by Anindita Basak ,2009 Publisher: Drling  
Kindersley(India)Pvt. Ltd., Pearson
3. Textbook of Environmental Studies by Deeksha Dave & S S Kateva , Cengage  
Publishers.
4. Environmental Sciences by Daniel B Botkin & Edward A Keller Publisher:  
John Wiley & Sons.
5. Environmental Studies by R. Rajagopalan, Oxford University Press
6. Environmental Studies by Benny Joseph, TMH publishers
7. Environmental Studies by Dr. Suresh K Dhameja, 2007 Published by : S  
K Kataria & Sons, New Delhi
8. Basics of Environmental Studies by U K Khare, 2011 Published by Tata McGraw  
Hill

### **Text Books:**

1. Textbook of Environmental Studies for Undergraduate Courses by Erach  
Bharucha Second edition,2013 Publisher: Universities Press (India) Private  
Ltd, Hyderabad

**Computer Engineering Department, Indus Institute of Engineering & Technology, Indus University**  
**Program - B. Tech (Computer Engineering/Computer Science & Engineering/Information Technology)**  
**SEMESTER - II**

| SEMESTER - II |        |                                              |        |                 |      |     |           |                   |     |           |     |       |         |
|---------------|--------|----------------------------------------------|--------|-----------------|------|-----|-----------|-------------------|-----|-----------|-----|-------|---------|
| Sr.<br>No.    |        | Name of the subject                          | Credit | Teaching Scheme |      |     |           | Evaluation Scheme |     |           |     |       | Segment |
|               |        |                                              |        | (per week)      |      |     |           | Theory            |     | Practical |     | Total |         |
|               |        |                                              |        |                 |      |     |           | CIE               | ESE | CIE       | ESE | Marks |         |
|               |        |                                              |        | Th.             | Tut. | Pr. | Tot (hr.) | Th.               | Th. | Pr.       | Pr. |       |         |
| 1             | MA0211 | Differential Equations & Linear Algebra      | 4      | 3               | 1    | 0   | 4         | 60                | 40  | 0         | 0   | 100   | BS      |
| 2             | PH0011 | Engineering Physics                          | 4      | 3               | 0    | 2   | 5         | 60                | 40  | 60        | 40  | 200   | BS      |
| 3             | EN0211 | Business Communication & Presentation Skills | 2      | 1               | 0    | 2   | 3         | 60                | 40  | 60        | 40  | 200   | HS      |
| 4             |        | <i>Open Elective 3</i>                       | 3      | 3               | 0    | 0   | 3         | 60                | 40  | 0         | 0   | 100   | OE      |
| 5             | ME0117 | Workshop Practice                            | 2      | 0               | 0    | 4   | 4         | 0                 | 0   | 60        | 40  | 100   | ES      |
|               |        | Indian Science Technology                    | 1      | 1               | 0    | 0   | 0         | 100               | 0   | 0         | 0   | 100   | VA      |
| 6             | CE0216 | Programming for Problem Solving              | 4      | 3               | 0    | 2   | 5         | 60                | 40  | 60        | 40  | 200   | ES      |
|               |        | Total                                        | 20     | 14              | 1    | 10  | 24        | 400               | 200 | 240       | 160 | 1000  |         |

|                                                           |                 |                  |                |                                      |                                         |                                                     |                                                        |              |
|-----------------------------------------------------------|-----------------|------------------|----------------|--------------------------------------|-----------------------------------------|-----------------------------------------------------|--------------------------------------------------------|--------------|
| <b>Subject: Differential Equations and Linear Algebra</b> |                 |                  |                |                                      |                                         |                                                     |                                                        |              |
| <b>Program: B. Tech CE/CSE/IT</b>                         |                 |                  |                | <b>Subject Code: MA0211</b>          |                                         |                                                     | <b>Semester: II</b>                                    |              |
| <b>Teaching Scheme</b>                                    |                 |                  |                | <b>Examination Evaluation Scheme</b> |                                         |                                                     |                                                        |              |
|                                                           |                 |                  |                | <b>University Theory Examination</b> | <b>University Practical Examination</b> | <b>Continuous Internal Evaluation (CIE)- Theory</b> | <b>Continuous Internal Evaluation (CIE)- Practical</b> | <b>Total</b> |
| <b>Lecture</b>                                            | <b>Tutorial</b> | <b>Practical</b> | <b>Credits</b> |                                      |                                         |                                                     |                                                        |              |
| <b>3</b>                                                  | <b>1</b>        | <b>0</b>         | <b>4</b>       | <b>40</b>                            | <b>0</b>                                | <b>60</b>                                           | <b>0</b>                                               | <b>100</b>   |

### Course Objectives:

1. To provide mathematical knowledge and skills needed to support their concurrent and subsequent engineering studies.
2. To provide an ability to apply knowledge of basic science and engineering fundamentals.
3. To provide an ability to undertake problem identification, formulation and solution.
4. To provide an ability to analyze different mathematical models within science and technology and work creatively, systematically and critically.
5. To provide an ability to find strategies for the solution of different types of mathematical models using knowledge about the possibilities and limitations of the different methods and tools.
6. To provide an ability to develop abstract, logical and critical thinking and the ability to reflect critically upon their work and work of others.
7. To provide an ability to insight their strengths and weakness as learners and to appreciate the value of errors or mistakes as powerful motivators to enhance learning and understanding.

|               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |             |
|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| <b>Unit 1</b> | <b>First order ordinary Differential Equations with applications</b><br><br>Revision of ordinary differential equation: Introduction of Mathematical Modeling, Basic Definitions, First Order First Degree Differential Equations, Variable Separable equation, Homogeneous Equation, Exact Differential Equations, Reduction of Non-Exact Differential Equations to exact form using Integrating Factors, First Order Linear Differential Equation, Bernoulli Equation<br><br>Applications: Orthogonal Trajectories, Simple Electric Circuits. | 11<br>hours |
| <b>Unit 2</b> | <b>Higher order ordinary differential equations with applications</b><br><br>Solution of Linear differential equations of higher order with constant coefficients, complimentary function and particular integral, Method of variation of parameters, Method of undetermined coefficient<br><br>Application of Linear differential equation - Application of Deflection of Beams, Electric circuits                                                                                                                                             | 12<br>hours |
| <b>Unit 3</b> | <b>Partial differential equations with applications</b><br><br>Formation of Partial differential equations, Lagrange's method, Directly Integrable equations, Method of separation of variables, solution of one dimensional wave equation, heat equation and Laplace equation.                                                                                                                                                                                                                                                                 | 11<br>hours |
| <b>Unit 4</b> | <b>Linear Algebra</b><br><br>Concepts of Determinants and Matrices, Types of Matrices<br>Row Echelon and Reduced Row Echelon form<br>Inverse of a Matrix, Rank of a Matrix, Normal Form<br>System of Linear Homogeneous Equations<br>System of Non-Homogeneous Equations, Gaussian Elimination Method<br>Eigen Values and Eigen Vectors - Properties of Eigen Values and Eigen Vectors, Caley Hamilton theorem                                                                                                                                  | 11<br>hours |

**Text Book:** B. V. Ramana, "Higher Engineering Mathematics", Tata McGraw Hill.

**Reference Books:**

1. Erwin Kreyszig, "Advanced Engineering Mathematics" (8th Edition), Wiley Eastern Ltd., New Delhi.
2. Dr. B.S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, New Delhi
3. Murray Spiegel, "Advanced Mathematics for Engineering & Science: Schaum's Outline Series", Tata McGraw Hill Publication
4. Merel C Potter, J.L. Goldberg, "Advanced Engineering Mathematics" (3rd Edition), Oxford India Publication.

| Subject: Engineering Physics |          |           |         |                               |                                  |                                              |                                                 |       |
|------------------------------|----------|-----------|---------|-------------------------------|----------------------------------|----------------------------------------------|-------------------------------------------------|-------|
| Program: B. Tech CE/CSE/IT   |          |           |         | Subject Code: PH0011          |                                  |                                              | Semester: II                                    |       |
| Teaching Scheme              |          |           |         | Examination Evaluation Scheme |                                  |                                              |                                                 |       |
| Lecture                      | Tutorial | Practical | Credits | University Theory Examination | University Practical Examination | Continuous Internal Evaluation (CIE)- Theory | Continuous Internal Evaluation (CIE)- Practical | Total |
| 3                            | 0        | 2         | 4       | 40                            | 40                               | 60                                           | 60                                              | 200   |

### Course Objectives:

1. To describe the basic laws of Physics, mathematical foundations and Engineering theory and to apply the knowledge in modeling and designing a real-world problem (**fundamental engineering analysis skills**).
2. To analyze a problem, identify and formulate using the concept of physics and to solve engineering problem (**engineering problem solving skills**).
3. To analyze and interpret experimental data using concepts of Physics (**information retrieval skills**).
4. To analyze and use current techniques, skills and tools necessary for Physics and engineering practice (**practical engineering analysis skills**).

## CONTENT

### UNIT-I : Introduction to Electromagnetic

[12 hours]

#### **Module1: Electrostatics & Dielectrics:**

Coulomb's law for distribution of charges, Gauss's law and applications, Electric field intensity, Electric flux, Electric dipole moment, Electric field due to dipole, Introduction to dielectrics, Polarizability, Types of polarization – electronic, ionic, orientational, Polarization of dielectrics, Gauss's law in presence of dielectric, Dielectric constant, Electric susceptibility and Permittivity, Internal (Local) field in dielectric, Clausius Mossotti equation (with derivation)

## **Module 2: Magnetism**

Magnetic field, Steady current, Ampere's law, Biot-Savart law and its applications, Faradays law of Induction, Lenz's Law; Effect of magnetic field on current carrying conductor, Lorentz force.

Basic important terms and units in Magnetism, Concept and origin of magnetic moment, magnetic susceptibility, Total angular momentum, Diamagnetism, Paramagnetism, Ferromagnetism, Ferrimagnetism, Antiferromagnetism, Domain theory of Ferromagnetism, Curie temperature and hysteresis loss

## **UNIT-II : Superconductivity and Sound**

[12 hours]

### **Module 1: Superconductivity**

Superconductivity: Zero resistance, Critical temperature, Meissner effect, Critical field, General properties of superconductors, Type-I and Type-II superconductors, BCS theory of Superconductor, High temperature superconductors, Applications of Superconductors: SQUID, Maglev etc.

### **Module 2: Sound**

Introduction to sound waves, Characteristics and Properties of Sound, Absorption coefficient, Reverberation time, Sabine's formula (without derivation), Factors affecting architectural acoustics,

Introduction of Ultrasonic waves, Generation of ultrasonic waves, Detection of ultrasonic waves, Applications of Ultrasonic waves: NDT, SONAR & others.

## **UNIT-III : Introduction to Quantum and Semiconductor Physics**

[12 hours]

### **Module 1: Quantum Mechanics**

Black body radiation: Planck's law; Wave nature of Particles: De-Broglie theorem, Uncertainty principle; Schrodinger's wave equation – Time independent and time dependent equations; Born interpretation, probability current; Solution of stationary-state Schrodinger equation for one dimensional problems– particle in a box

### **Module 2 : Introduction to solids and Semiconductor Physics**

Kronig-Penny model (to introduce origin of band gap), Energy bands in solids, E-k diagram; Types of electronic materials: metals, semiconductors, and insulators, Density of states, Occupation probability, Fermi level, Effective mass.



Intrinsic and extrinsic semiconductors, Dependence of Fermi level on carrier-concentration and temperature (equilibrium carrier statistics), Carrier generation and recombination, Carrier transport: diffusion and drift, p-n junction diode.

## **UNIT-IV : Wave Optics & Laser**

[12 hours]

### **Module 1: Wave optics**

Huygens' principle, superposition of waves and interference of light by wave front splitting and amplitude splitting; Young's double slit experiment, Newton's rings, Farunhofer diffraction from a single slit, the Rayleigh criterion for limit of resolution and its application to vision; Diffraction gratings and their resolving power, Michelson interferometer

### **Module 2: Laser**

Einstein's theory of matter radiation interaction and A and B coefficients; Amplification of light by population inversion, Properties of laser beams: monochromaticity, coherence, directionality and brightness; Different types of lasers: gas lasers (He-Ne), solid-state lasers (Neodymium); Applications of lasers in science, engineering and medicine.

### **Course Outcomes:**

1. To apply the concepts of Physics in various branches of Engineering.
2. To apply the knowledge of Physics to formulate and solve Engineering problems through numerical analysis & laboratory methods.
3. To apply the techniques, skills and modern tools of Physics necessary for Engineering applications.
4. To apply the basic idea of Physics to design and conduct experiments, analyze and interpret data.
5. To apply the concepts of Physics to design a system, a component, a process or a measurement technique to meet specific criteria
6. To apply the knowledge of contemporary issues and to function on multidisciplinary teams

### **Text Books**

1. Engineering Physics by H K Malik, A K Singh, Tata Mc Graw-Hill Education Pvt. Ltd., 2nd edition, 2018, ISBN: 978-93-5260-695-5

2. Engineering Physics by D.K. Bhattacharya, Poonam Tandon, Oxford University Press, first published, 2015, ISBN-13:978-0-19-945281-1

### **Reference Books**

1. Engineering Physics; Fundamentals and Modern applications by P. Khare & A. Swarup, Jones & Bartlett Learning, 2009, ISBN-13: 978-0763773748
2. A textbook of Engineering Physics by S.O. Pillai and Sivakami, New Age International, Third edition, 2011, ISBN:978-81-224-3162-9
3. David Griffiths, Introduction to Electrodynamics
4. An introduction to Electrodynamics by David Griffiths, Pearson Education, 3<sup>th</sup> edition, 1999, ISBN:9780138053260
5. Optics by A. Ghatak, McGraw-Hill Education India Private Limited, 6<sup>th</sup> edition, 2017, ISBN-13:978-9339220907
6. Engineering Electromagnetics by W H Hayt & J A Buck, McGraw-Hill Education, 8<sup>th</sup> edition, 2017, ISBN-13:978-9339203276
7. Engineering Physics by K. Rajagopal, Prentice Hall of India Pvt. Ltd., 2007, ISBN: 9788120332867
8. A Textbook of Engineering Physics by M. N. Avadhanulu, P. G. Khirsagar, S.Chand Pub., Revised edition, 1992, ISBN: 9788121908177
9. University Physics, Sears and Zemansky, Pearson Education India, 13<sup>th</sup> edition, 2013, ISBN-13:978-8131790274

### **Web resources:**

1. Acoustics & Optics: [http://www.nptel.iitm.ac.in/courses/Webcourse-contents/IIT%20Guwahati/engg\\_physics/index\\_cont.htm](http://www.nptel.iitm.ac.in/courses/Webcourse-contents/IIT%20Guwahati/engg_physics/index_cont.htm)
2. Engineering Physics: <http://www.nptelvideos.in/search?q=engineering+physics>
3. Laser: <http://science.howstuffworks.com/laser1.htm>
4. Optics: <http://www.pitt.edu/~poole/physics.html#light>
5. Magnetism: <https://www.khanacademy.org/science/physics/magnetic-forces-and-magnetic-fields>
6. Interference: <https://www.khanacademy.org/science/physics/light-waves>

7. Quantum Mechanics: <https://ocw.mit.edu/courses/physics/8-04-quantum-physics-i-spring-2016/index.htm>

**MOOCs:**

<https://www.edx.org/course/subject/physics>

**LIST OF EXPERIMENTS**

| Experiment no. | Title                                                                                                                            | Learning Outcomes                                                                                                                                                                                                                                                                             |
|----------------|----------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1              | <b>Dielectric constant:</b> To determine the dielectric constant of a dielectric substance.                                      | <ol style="list-style-type: none"> <li>1. To understand the properties of dielectric material</li> <li>2. To study the dielectric constant with respect to capacitance of variable and test capacitor</li> <li>3. To understand the difference between variable and test capacitor</li> </ol> |
| 2              | To determine the <b>magnetic field at the center of a coil and its variation with distance and radius of the coil.</b>           | <ol style="list-style-type: none"> <li>1. To see the effect of magnetic field with different radius of coil</li> <li>2. To verify Biot-Savart law</li> <li>3. To study the use of tangent galvanometer</li> </ol>                                                                             |
| 3              | To verify the <b>Faraday's law of electromagnetic induction.</b>                                                                 | <ol style="list-style-type: none"> <li>1. To study the Faraday's law</li> <li>2. To understand the variation of magnetic field</li> </ol>                                                                                                                                                     |
| 4              | <b>Hysteresis loss:</b> To determine the Hysteresis loss in a Ferromagnetic material.                                            | <ol style="list-style-type: none"> <li>1. To study hysteresis loss for ferromagnetic material</li> <li>2. To understand the hysteresis curve for ferromagnetic material</li> <li>3. To understand the use of CRO</li> </ol>                                                                   |
| 5              | <b>Ultrasonic Interferometer:</b> To determine the wavelength and velocity of ultrasonic wave through ultrasonic interferometer. | <ol style="list-style-type: none"> <li>1. To calculate wavelength and velocity of ultrasound in liquid medium</li> <li>2. To understand the properties of Ultrasonic wave</li> </ol>                                                                                                          |
| 6              | <b>Planck's Constant:</b> To determine the Planck's Constant using LED                                                           | <ol style="list-style-type: none"> <li>1. To study V-I characteristics of different LED</li> <li>2. To find the variation of current with temperature</li> <li>3. To see the relation between band gap and Planck's constant &amp; calculating the value of it</li> </ol>                     |
| 7              | To study the <b>V-I characteristics of p-n junction diode</b>                                                                    | <ol style="list-style-type: none"> <li>1. To understand the working of a p-n junction diode.</li> </ol>                                                                                                                                                                                       |
| 8              | To verify the Inverse Square Law using Photocell                                                                                 | <ol style="list-style-type: none"> <li>1. To understand the relation between current and intensity of radiation.</li> </ol>                                                                                                                                                                   |

|            |                                                                                                              |                                                                                                                                                                                                                                                                                                          |
|------------|--------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>9</b>   | To determine the <b>refractive index of prism</b> using Spectrometer                                         | <ol style="list-style-type: none"> <li>1. To understand the phenomena of refraction and dispersion of light rays.</li> <li>2. To familiarize with the instrument spectrometer.</li> </ol>                                                                                                                |
| <b>10</b>  | <b>Resolving power of grating:</b> To determine resolving power of a diffraction grating.                    | <ol style="list-style-type: none"> <li>1. To understand the diffraction phenomena of light</li> <li>2. To understand the use of diffraction grating</li> </ol>                                                                                                                                           |
| <b>11</b>  | <b>Newton's Ring:</b> To determine the wavelength of monochromatic light                                     | <ol style="list-style-type: none"> <li>1. To familiarize with travelling microscope</li> <li>2. To understand the phenomena of monochromatic light &amp; calculating wavelength of it</li> <li>3. To understand the use of optical lenses</li> </ol>                                                     |
| <b>12.</b> | <b>Determination of Wavelength of Laser:</b> To determine the wavelength of LASER using diffraction grating. | <ol style="list-style-type: none"> <li>1. To understand the properties of Laser</li> <li>2. To understand the diffraction phenomena of light</li> <li>3. To study the use of diffraction grating</li> <li>4. To calculate the wavelength of laser</li> <li>5. To study the use of single slit</li> </ol> |

| <b>Subject: Business Communication &amp; Presentation Skills</b> |                 |                  |                |                                      |                                         |                                                     |                                                        |              |
|------------------------------------------------------------------|-----------------|------------------|----------------|--------------------------------------|-----------------------------------------|-----------------------------------------------------|--------------------------------------------------------|--------------|
| <b>Program: B. Tech CE/CSE/IT</b>                                |                 |                  |                | <b>Subject Code: EN0211</b>          |                                         |                                                     | <b>Semester: II</b>                                    |              |
| <b>Teaching Scheme</b>                                           |                 |                  |                | <b>Examination Evaluation Scheme</b> |                                         |                                                     |                                                        |              |
| <b>Lecture</b>                                                   | <b>Tutorial</b> | <b>Practical</b> | <b>Credits</b> | <b>University Theory Examination</b> | <b>University Practical Examination</b> | <b>Continuous Internal Evaluation (CIE)- Theory</b> | <b>Continuous Internal Evaluation (CIE)- Practical</b> | <b>Total</b> |
| <b>1</b>                                                         | <b>2</b>        | <b>0</b>         | <b>3</b>       | <b>40</b>                            | <b>0</b>                                | <b>60</b>                                           | <b>0</b>                                               | <b>100</b>   |

### **Course Objectives:**

1. To orient students about the varied uses of business communication.
2. Under the importance of personality and its reflection in communication.
3. Train students to develop business correspondence in writing and presentation skills.

## **CONTENT**

### **Unit 1: Business Communication**

- Business Communication- Importance
- Information Age and Communication/Social Media
- Organizational Communication for Engineers
- Common Barriers in Professional Communication/Role Play
- Organizational Etiquettes

### **Unit 2: Presentation Skills**

- Planning, Preparing and Practice
- Audience Interaction
- Importance of AV Aids
- Best Presentation Videos
- Group Presentations/Pair Presentations/Teacher Review
- Group Presentations/Pair Presentations/ Peer Review

### **Unit 3: Writing Skills**

- Mind-mapping and Planning
- Paragraph Development with 7 c's
- Picture Elicitation
- Contrastive and Comparative Essays
- Completing a Story and Describing Situations

### **Unit 4: Writing Skills II**

- Composing Drafts
- Letters / Good, Bad & Neutral Messages
- Emails/ Sample Analysis
- Creating a Blog

### **Reference Books:**

1. Fred Luthans, Organizational Behaviour, McGraw Hill
2. Lesikar and petit, Report writing for Business
3. M. Ashraf Rizvi, Effective Technical Communication, McGraw Hill
4. Wallace and masters, Personal Development for Life and Work, Thomson Learning
5. Hartman Lemay, Presentation Success, Thomson Learning
6. Malcolm Goodale, Professional Presentations
7. Farhathullah, T. M. Communication skills for Technical Students
8. Michael Muckian, John Woods, The Business letters Handbook
9. Herta A. Murphy, Effective Business Communication
10. Lehman, Dufrene, Sinha BCOM, Cengage Learning

### **Web resources/ MOOCs:**

1. Business Conversation Rule 1:  
<https://www.youtube.com/watch?v=wB8mr4iViy0>
2. Business English Conversations Rule 2:  
<https://www.youtube.com/watch?v=wB8mr4iViy0>
3. Business English Conversations 3:  
<https://www.youtube.com/watch?v=wB8mr4iViy0>

4. Business English Conversations Rule 4:  
<https://www.youtube.com/watch?v=wB8mr4iViy0>

5. Business English Conversations Rule 5:  
<https://www.youtube.com/watch?v=wB8mr4iViy0>

6. English Presentation Video:  
<https://www.youtube.com/watch?v=wB8mr4iViy0>

7. Powerful Presentation Skills: Body Language:  
<https://www.youtube.com/watch?v=wB8mr4iViy0>

8. Make Body Language Your Superpower:  
<https://www.youtube.com/watch?v=wB8mr4iViy0>

Make a Presentation Like Steve Jobs:  
<https://www.youtube.com/watch?v=wB8mr4iViy0>

| Subject: Workshop Practice (ES) |          |           |         |                               |                                  |                                             |                                                |             |
|---------------------------------|----------|-----------|---------|-------------------------------|----------------------------------|---------------------------------------------|------------------------------------------------|-------------|
| Program: B. Tech CE/CSE/IT      |          |           |         | Subject Code: ME0117          |                                  | Semester: II                                |                                                |             |
| Teaching Scheme                 |          |           |         | Examination Evaluation Scheme |                                  |                                             |                                                |             |
| Lecture                         | Tutorial | Practical | Credits | University Theory Examination | University Practical Examination | Continuous Internal Evaluation (CIE) Theory | Continuous Internal Evaluation (CIE) Practical | Total Marks |
| 0                               | 0        | 4         | 2       | ***                           | 40                               | ***                                         | 60                                             | 100         |

### Course Objective:

1. Recognize the importance of Workshop in today's technology and its impacts on market competition.
2. Understand the basics of various methodologies to manufacture components/structure.
3. Understand different tools and equipment used in mechanical, electrical, electronics and computer workshops.
4. Analyze the engineering and economical aspects of workshop practices.

| COURSE CONTENT |                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |             |
|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| <b>1</b>       | <b>Introduction to Workshop and Layout</b><br>Introduction, Safety rules in Mechanical workshop, Safety slogans, Tools and Equipment used for safety in Mechanical workshop. Types of layouts, Rules and regulations for Workshop layouts and Preparation of actual layout.                                                                                                                                                                                                | <b>[02]</b> |
| <b>2</b>       | <b>Mechanical Fitting, Carpentry, Shop Shop</b><br>Introduction, Classification and characteristics of Engineering Materials, Tools and Equipment for Fitting shop, Different operations, preparation of job in Fitting shop, Wooden Materials, Tools and Equipment for Carpentry shop, Different operations, preparation of job in Carpentry shop. Sheet Materials, Different operations, Tools and Equipment for Tin Smithy shop, preparation of job in Tin Smithy shop. | <b>[10]</b> |
| <b>3</b>       | <b>Electronics workshop</b><br>Passive components and Active components, Voltage Sources, Measuring Instruments, Electronic Workshop Tools, Electronic circuit Drawing, Electronic circuit on breadboard, Soldering/ desoldering, electronic circuit on general purpose PCB, Manually Prepare PCB layout, Fabrication of PCB, component mounting,                                                                                                                          | <b>[06]</b> |



|   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |      |
|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
|   | Soldering, testing & troubleshooting of circuits on PCB.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |      |
| 4 | <p><b>Electrical Workshop</b></p> <p>SWITCHES Toggle switch- SPDT, DPDT, TPDT, Rotary switch types depending on their poles and positions Rocker switch, Push button latch and non-latch, General specifications of cables- characteristic impedance, current carrying capacity, flexibility. Types of cables , Different types of wiring system, FUSES Glass ,Ceramic fuse, Resettable fuse, HRC fuse, RELAYS construction, working and application of General purpose relay, Difference between switch &amp; relay , Construction working and applications MCB , Construction working and applications Energy meter, Electric Shock, First aid for electric shock, importance of grounding.</p>                                                                                                                                                                                                                                                                                                                                           | [06] |
| 5 | <p><b>Introduction of Computer Component</b></p> <p>Introduction of hardware peripherals components, Block Diagram of Computer and Computer Generation, Processor and its generations, Motherboards Chipset and its external and internal components, BIOS and the Boot Process, Computer Memory types, working of SMPS, storage device (Hard Disk Drive, SSD, CD/DVDs Drives), Printers types (Dot-Matrix Printer, Inkjet Printer, Laser Printer)</p> <p>Network Components: Introduction of Network Cable like UTP, STP, Fiber Optics, Hub, Unmanageable Switch, Manageable Switch, Router, Modem, Wi-Fi, Access Point, PCI Wireless Card, USB Wireless Device, Print Server, prepare network cable using climbing tools and connectors, understanding basic Network topologies, cramping of LAN, Setting up connection between PCs, File Transferring and Sharing.</p> <p>Operating System AND Software installation: Introduction to OS, Types of Operating systems, System files FAT and NTFS, installing process of different OS,</p> | [06] |

**Course Outcome:**

After learning the course, the students should be able to:

1. Prepare edges for better joints for fitting, welding, carpentry.
2. Prepare various shapes and objects by using Carpentry, Fitting, and Welding.
3. Identify a particular component from the given group of passive and active electronic components
4. Build/test and troubleshoot electronic circuits on breadboard and general purpose PCB
5. Recognize importance of electrical energy and its day to day applications
6. Use of Electrical Protective devices –fuses, relay and MCB

## **LIST OF EXPERIMENTS**

1. To study safety rules, Workshop layout and preparation of actual layout of Mechanical Workshop.
2. To study about Fitting shops and preparing for a job.
3. To study about Carpentry shops and job preparation.
4. To study about the Tin Smithy shop and prepare for a job.
5. Draw the circuit diagrams of various (Simple to Complex) electronic circuits on drawing sheets
6. Identify and measure the terminals components using measuring instruments
7. Demonstrate external controls of CRO & function Generator.
8. Electronics Mini Project
9. Performance of Staircase Wiring & Godown Wiring
10. Demonstration of Different Types of Circuit Breakers.
11. Demonstration of Earthing Principle.
12. Demonstration of Energy Meter.
  
13. Demonstrate different types of computer hardware and prepare summary reports.
  
14. Demonstrate different components of Motherboard and its external connection port.
  
15. To study about different network devices and network topology.
  
16. To study the preparation of network cable using climbing tools and connectors.
  
17. To study the installation process of different OS.

| <b>Subject: Programming for Problem Solving</b> |                 |                  |                |                                              |                                         |                                                    |                                                       |              |
|-------------------------------------------------|-----------------|------------------|----------------|----------------------------------------------|-----------------------------------------|----------------------------------------------------|-------------------------------------------------------|--------------|
| <b>Program: B. Tech CE/CSE/IT</b>               |                 |                  |                | <b>Subject Code: CE0216</b>                  |                                         |                                                    | <b>Semester: II</b>                                   |              |
| <b>Teaching Scheme (Hours per week)</b>         |                 |                  |                | <b>Examination Evaluation Scheme (Marks)</b> |                                         |                                                    |                                                       |              |
| <b>Lecture</b>                                  | <b>Tutorial</b> | <b>Practical</b> | <b>Credits</b> | <b>University Theory Examination</b>         | <b>University Practical Examination</b> | <b>Continuous Internal Evaluation (CIE)-Theory</b> | <b>Continuous Internal Evaluation (CIE)-Practical</b> | <b>Total</b> |
| <b>3</b>                                        | <b>0</b>        | <b>2</b>         | <b>4</b>       | <b>60</b>                                    | <b>60</b>                               | <b>40</b>                                          | <b>40</b>                                             | <b>200</b>   |

### **Course Outcomes:**

- 1) To familiarize the student with basic concepts of computer programming and developer tools.
- 2) To describe the parts of the computer system.
- 3) To describe functioning of computer components.
- 4) To describe the process of problem-solving using computer.
- 5) To describe the design an algorithmic solution for a given problem.
- 6) To describe writing method for maintainable 'C' program for a given algorithm.
- 7) To describe the importance of 'C' program for simple applications of real-life using structures and files.
- 8) The students will be able to enhance their analyzing and problem-solving skills and use the same for writing programs in 'C'

## **CONTENTS**

### **UNIT-I**

**[12 hours]**

#### **Introduction to Programming:**

What is programming? Problem solving methods with Examples-Algorithm and Flowchart, Types of Programming languages, Characteristics of higher level language, Some Programming languages

#### **Introduction to 'C':**

Introduction, Importance of C, Sample C programs, Basic structure of C programs, Programming style, executing a C program.

Introduction, Character Set, C tokens, Keywords and Identifiers, Constants, Variables, Data types, Declaration of Variables, Defining symbolic constants

## **Operators and Expression:**

Introduction, Arithmetic of Operators, Relational Operators, Logical Operators, Assignment Operators, Increment and Decrement Operators, Conditional Operators, Bitwise Operators, Special Operators, Arithmetic Expressions, Evaluation of expressions, Precedence of arithmetic operators, Type conversions in expressions, Mathematical function

### **UNIT-II**

**[12 hours]**

#### **Decision Making Statements**

Introduction, Decision making with IF statement, Simple IF statement, the IF ELSE statement, Nesting of IF ... ELSE statements, The ELSE IF ladder, The switch statement, the ternary (? :) Operator, the GOTO statement

#### **Looping**

WHILE statement, the DO statement, The FOR statement, Jumps in loops Break and continue

#### **Array & Handling of Character strings:**

Introduction, One-dimensional arrays, Two-dimensional arrays, Initialization of two dimensional arrays, Concept of Multidimensional arrays

### **UNIT-III**

**[12 hours]**

#### **Handling of Character strings:**

Introduction, Declaring and initializing string variables, reading string from terminal, writing string to screen, Arithmetic operations on characters, Putting string together, String Operations: String Copy, String Compare, String Concatenation and String Length, String Handling functions, Table of strings

#### **User-Defined Functions:**

Introduction, need for user-defined functions, return values and their types, calling a function, category of functions, no arguments and no return values, Arguments with return values, Handling of non-integer functions, Nesting of functions, Recursion, Functions with arrays, The scope and Lifetime of variables in functions

### **UNIT-IV**

**[12 hours]**

#### **Pointers:**

Introduction, understanding pointers, Accessing the address of variable, Declaring and initializing pointers, Accessing a variable through its pointer, Pointer expressions, Pointer increments and scale factor, Pointers and arrays, Pointers and character strings, Pointers and Functions, Pointers and structures

### **Structures and Unions:**

Introduction, Structure definition, Giving values to members, Structure initialization, Comparison of structures, Arrays of structures, Arrays within structures, Structures within Structures, Structures and functions, Unions

### **File Handling:**

Introduction, Defining and opening File, Closing File, Input/output operations on Files

### **Course Outcomes:**

By participating in and understanding all facets of this course a student will be able to:

- 1) **Gain** a broad perspective about the usage of computers in engineering industry.
- 2) **Develop** basic understanding of computer programs, concept of algorithm and algorithmic thinking.
- 3) **Develop** the ability to analyze a problem and write an algorithm and program to solve it.
- 4) **Develop** logical thinking ability and applying basic programming principles using 'C' language.
- 5) **Development** of different 'C' programming features and structures in order to solve different problems considering as an initial step towards software development.
- 6) **Apply** fundamental principles of problem solving in software engineering through various programming languages.

### **Text Books:**

1. Programming in ANSI C, by Balagurusamy, Publisher - Tata McGraw Hill.

### **Reference Books:**

1. Introduction to 'C' by Reema Thareja, Publisher-Oxford
2. Programming with ANSI and Turbo C, by Ashok N Kamthane, Publisher – Pearson Education.
3. Let us C, by Yashwant Kanetkar, Publisher – BPB Publication

### **Web Resources**

1. <http://nptel.ac.in/courses/106105085/2>
2. [https://onlinecourses.nptel.ac.in/iitk\\_cs\\_101/preview](https://onlinecourses.nptel.ac.in/iitk_cs_101/preview)
3. [https://onlinecourses.nptel.ac.in/noc15\\_cs15/preview](https://onlinecourses.nptel.ac.in/noc15_cs15/preview)

## LIST OF EXPERIMENTS

| <b>Experiment. No.</b> | <b>Title</b>                                                                                                                                                                                      | <b>Learning Outcomes</b>                                         |
|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------|
| 1.1                    | Write a program to print the address of INDUS.                                                                                                                                                    | Understanding basic input output functions                       |
| 1.2                    | Write a program to perform basic arithmetic operators on given two numbers.                                                                                                                       | Understanding basic input output functions and operators         |
| 1.3                    | Find the area and perimeter of square and rectangle and circle. Input the side(s) through the keyboard. (use PI as symbolic constant)                                                             | Understanding basic input output functions and operators         |
| 1.4                    | Write a program to swap values of 2 variables (i) with extra variable and (ii) without using an extra variable.                                                                                   | Swapping of Two Values                                           |
| 1.5                    | Write a program to print the ASCII value of a given character.                                                                                                                                    | Understanding the ASCII value and Print ASCII Value of character |
| 1.6                    | Write a program to enter the integer number and convert it into Rs and Paisa.                                                                                                                     | Understanding basic input output functions and operators         |
| 1.7                    | Write a program to enter two numbers. Make the comparison between them with conditional operator. If the first number is greater than second perform multiplication otherwise division operation. | Understanding basic input output functions and operators         |
| 1.8                    | Write a program to enter the temperature in Fahrenheit and convert it to Celsius.[ $C = ((F-32)*5)/9$ ]                                                                                           | Understanding basic input output functions and operators         |
| 1.9                    | Write a program to calculate simple interest.                                                                                                                                                     | Understanding basic input output functions and operators         |
| 1.10                   | Write a program to enter marks of five subject of a student and calculate its average, percentage.                                                                                                | Understanding basic input output functions and operators         |
| 2.                     | <b>Using conditional statements</b>                                                                                                                                                               |                                                                  |
| 2.1                    | Write a program to find the maximum of (i) two integer values and (ii) three integer values.                                                                                                      | Knowledge of conditional statements                              |

| 2.2            | Write a program to check whether the given character is a vowel or not.                                                                                                                                                                                                                                                                                                                                                                                                                | Knowledge of conditional statements       |            |           |       |     |     |                |      |     |         |      |     |                                     |
|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|------------|-----------|-------|-----|-----|----------------|------|-----|---------|------|-----|-------------------------------------|
| 2.3.           | Write a program that reads a number from 1 to 7 and accordingly it should display MONDAY to SUNDAY (if- else if).                                                                                                                                                                                                                                                                                                                                                                      | Knowledge of conditional statements       |            |           |       |     |     |                |      |     |         |      |     |                                     |
| 2.4            | Write a menu driven program to perform the arithmetic operations.                                                                                                                                                                                                                                                                                                                                                                                                                      | Knowledge of conditional statements       |            |           |       |     |     |                |      |     |         |      |     |                                     |
| 2.5            | Write a program to print number of days in a given month using switch statement. The program requires month number (between 1to 12) as an input and then displays number of days in that month.                                                                                                                                                                                                                                                                                        | Knowledge of conditional statements       |            |           |       |     |     |                |      |     |         |      |     |                                     |
| 2.6            | Write a program to check whether a given value is even or odd.                                                                                                                                                                                                                                                                                                                                                                                                                         | Knowledge of conditional statements       |            |           |       |     |     |                |      |     |         |      |     |                                     |
| 2.7            | Write a program to calculate total salary of an employee.<br>total salary = basic + da + hra + ta. da = 50% of basic.<br><br><table border="1" style="margin-left: 20px;"> <thead> <tr> <th><u>Basic</u></th> <th><u>hra</u></th> <th><u>ta</u></th> </tr> </thead> <tbody> <tr> <td>&lt;6000</td> <td>400</td> <td>100</td> </tr> <tr> <td>6001&gt;= &amp;&lt;10000</td> <td>1400</td> <td>300</td> </tr> <tr> <td>&gt;=10000</td> <td>2400</td> <td>700</td> </tr> </tbody> </table> | <u>Basic</u>                              | <u>hra</u> | <u>ta</u> | <6000 | 400 | 100 | 6001>= &<10000 | 1400 | 300 | >=10000 | 2400 | 700 | Knowledge of conditional statements |
| <u>Basic</u>   | <u>hra</u>                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | <u>ta</u>                                 |            |           |       |     |     |                |      |     |         |      |     |                                     |
| <6000          | 400                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 100                                       |            |           |       |     |     |                |      |     |         |      |     |                                     |
| 6001>= &<10000 | 1400                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 300                                       |            |           |       |     |     |                |      |     |         |      |     |                                     |
| >=10000        | 2400                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 700                                       |            |           |       |     |     |                |      |     |         |      |     |                                     |
| 3.             | <b>Using control statements</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                           |            |           |       |     |     |                |      |     |         |      |     |                                     |
| 3.1            | Write a program to print 1 to 10 numbers using while loop.                                                                                                                                                                                                                                                                                                                                                                                                                             | Knowledge of control & looping statements |            |           |       |     |     |                |      |     |         |      |     |                                     |
| 3.2            | Write a program to read any 7 numbers and print the average value using for loop.                                                                                                                                                                                                                                                                                                                                                                                                      | Knowledge of control & looping statements |            |           |       |     |     |                |      |     |         |      |     |                                     |
| 3.3            | Write a program to reverse a given integer number.                                                                                                                                                                                                                                                                                                                                                                                                                                     | Knowledge of control & looping statements |            |           |       |     |     |                |      |     |         |      |     |                                     |
| 3.4            | Write a program to print Fibonacci series of given number.                                                                                                                                                                                                                                                                                                                                                                                                                             | Knowledge of control & looping statements |            |           |       |     |     |                |      |     |         |      |     |                                     |
| 3.5            | Write a program to find factorial of a number.                                                                                                                                                                                                                                                                                                                                                                                                                                         | Knowledge of control & looping statements |            |           |       |     |     |                |      |     |         |      |     |                                     |

|            |                                                                                                                                                                                                   |                                           |
|------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|
| <b>3.6</b> | <p>Write a program to check whether a number is a Krishnamurthy number or not. Krishnamurthy number is one whose sum of factorial of digits equals the number. ----</p> $5! = 1 + 24 + 120 = 145$ | Knowledge of control & looping statements |
| <b>3.7</b> | <p>Write a program to check whether the number is Armstrong or not.</p> <p>Example:153----<math>1^3 + 5^3 + 3^3 = 1 + 125 + 27 = 153</math></p>                                                   | Knowledge of control & looping statements |
| <b>3.8</b> | <p>Write a program to list all prime numbers within given range.</p>                                                                                                                              |                                           |



**3.9**

Write a program to draw following patterns:

```
*  
  
**  
  
***  
  
****  
  
*****  
  
1  
  
a b  
  
123  
  
a b c d  
  
1 2 3 4 5  
  
  
5 4 3 2 1  
  
4 3 2 1  
  
3 2 1  
  
2 1  
  
1  
  
A  
  
AB  
  
ABC  
  
ABCD  
  
ABCDE  
  
1  
  
121  
  
12321  
  
1234321  
  
1  
  
01  
  
101  
  
0101  
  
10101
```

| 4    | <b>Arrays &amp; Strings</b>                                                                                                       |                                              |
|------|-----------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|
| 4.1  | Write a program to read 10 integers in an array. Find the addition of all elements.                                               | To Understand and Implement 1 D Array        |
| 4.2  | Write a program to find number of odd and even elements from the 1- D array.                                                      | To Understand and Implement 1 D Array        |
| 4.3  | Write a program to reverse the elements of array and store it in another array.                                                   | To Understand and Implement 1 D Array        |
| 4.4  | Write a program to sort elements of array.                                                                                        | To Understand and Implement 1 D Array        |
| 4.5  | Write a Program to print Addition of two matrices.                                                                                | To Understand and Implement 2 D Array        |
| 4.6  | Program to remove duplicate numbers from a list of numbers and print the list without duplicate numbers.                          | To Understand and Implement 1 D Array        |
| 4.7  | Write a Program to print Multiplication of two matrices.                                                                          | To Understand and Implement 2 D Array        |
| 4.8  | Read the marks of five subjects obtained by five students in an examination. Display the top two student's codes and their marks. | To Display Top Student Codes and Marks       |
| 4.9  | Write a program to insert an element in an array at specified position.                                                           | To Understand and Implement 1 D Array        |
| 4.10 | Write a program to find the length of a string. (without inbuilt Function)                                                        | To Understand and Implement String           |
| 4.11 | Write a program to reverse the string.(without inbuilt Function)                                                                  | To Understand and Implement String           |
| 4.12 | Write a program to convert a string in to lower case and upper case.                                                              | To Understand and Implement String           |
| 4.13 | Write a menu driven program for the implementation of all build-in string functions.                                              | To Understand and Implement String Functions |
| 4.14 | Program to extract n characters starting from m in a given string. (String, n and m should be provided as inputs).                | To Understand and Implement String Functions |
| 4.15 | Find out occurrence of each character in a given string.                                                                          | To Understand and Implement String           |
| 5.   | <b>Structure &amp; Union</b>                                                                                                      |                                              |

|      |                                                                                                                                                          |                                  |
|------|----------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|
| 5.1  | Write a program to define structure with tag state with fields state name, number of districts and total population. Read and display the data.          | Knowledge of structure and union |
| 5.2  | Write a program to create a structure of 5 student's roll_no and name and display the records. Use array of structure                                    | Knowledge of structure and union |
| 5.3  | Write a program to create structure of bank with accno, holder_name and balance and display them for n holders whose balance is less than 5000.          | Knowledge of structure and union |
| 5.4  | Write a program to create union of student's roll_no and name and display the records.                                                                   | Knowledge of structure and union |
| 6.   | <b>Pointers &amp; Functions</b>                                                                                                                          |                                  |
| 6.1  | Write a program that demonstrates the use of address of (&) and pointer (*) operator.                                                                    | Use of pointers & Functions      |
| 6.2  | Write a program to read and display values of an integer array. Allocate space dynamically for the array.                                                | Use of pointers & Functions      |
| 6.3  | Write a program to display the content of 1-D array using pointer.                                                                                       | Use of pointers & Functions      |
| 6.4  | Write a program to sum given two integer numbers using function.                                                                                         | Use of pointers & Functions      |
| 6.5  | Write a program using function to count the area of circle, triangle, rectangle and square.                                                              | Use of pointers & Functions      |
| 6.6  | Write a program using user defined function even _odd. With argument and check whether the no is even or odd.                                            | Use of pointers & Functions      |
| 6.7  | Write a program using function with array, takes input of five subject's marks and count the percentage and display result.                              | Use of pointers & Functions      |
| 6.8  | Write a function which accepts a character array as argument from the user. The function should convert all the lowercase characters into uppercase case | Use of pointers & Functions      |
| 6.9  | Write a function using pointer parameter that calculate maximum element from given array of integer number.                                              | Use of Pointers & Functions      |
| 6.10 | Write a program that demonstrates call by value and call by reference concept in function argument.                                                      | Use of pointers & Functions      |

| Subject: Indian Science and Technology |          |           |         |                               |                                  |                                             |                                                |       |
|----------------------------------------|----------|-----------|---------|-------------------------------|----------------------------------|---------------------------------------------|------------------------------------------------|-------|
| Program: B.Tech. – All Branches        |          |           |         | Subject Code:IST0001          |                                  |                                             | Semester: 1 <sup>st</sup> Year                 |       |
| Teaching Scheme                        |          |           |         | Examination Evaluation Scheme |                                  |                                             |                                                |       |
| Lecture                                | Tutorial | Practical | Credits | University Theory Examination | University Practical Examination | Continuous Internal Evaluation (CIE)-Theory | Continuous Internal Evaluation (CIE)-Practical | Total |
| 01                                     | 00       | 00        | 01      | 00                            | 00                               | 100                                         | 00                                             | 100   |

| Module No. | Topic No. | Topic Name                                                                        | Allotted Lectures |
|------------|-----------|-----------------------------------------------------------------------------------|-------------------|
| 1          |           | <b>Fundamentals</b>                                                               | 2                 |
|            | 1.1       | An overview of Indian contributions to technology                                 |                   |
|            | 1.2       | Technological Innovations                                                         |                   |
| 2          |           | <b>Metallurgy, Textile and Chemistry</b>                                          | 3                 |
|            | 2.1       | Copper/Bronze/Zinc                                                                |                   |
|            | 2.2       | Iron and Steel Technology in India                                                |                   |
|            | 2.3       | Textile and dyeing – Indian Specialities                                          |                   |
|            | 2.4       | Chemistry                                                                         |                   |
| 3          |           | <b>Water Management</b>                                                           | 3                 |
|            | 3.1       | Overview                                                                          |                   |
|            | 3.2       | Harappan water management                                                         |                   |
|            | 3.3       | Other case studies                                                                |                   |
|            | 3.4       | Medieval Water structures                                                         |                   |
| 4          |           | <b>Transportation</b>                                                             | 1                 |
|            | 4.1       | Modes of transportation and its reforms                                           |                   |
|            | 4.2       | Development of trading activities                                                 |                   |
| 5          |           | <b>Mathematics</b>                                                                | 3                 |
|            | 5.1       | An overview of the development of mathematics in India                            |                   |
|            | 5.2       | Mathematics contained in <i>Sulbasutras</i><br>Weaving mathematics into beautiful |                   |
|            | 5.3       | poetry: Bhaskaracarya                                                             |                   |
|            | 5.4       | The evolution of sine function in India                                           |                   |
|            | 5.5       | The discovery of calculus by Kerala astronomers                                   |                   |
| 6          |           | <b>Astronomy</b>                                                                  | 2                 |
|            | 6.2       | Vedanga Jyotish                                                                   |                   |
|            | 6.1       | Measuring Time and Calendar                                                       |                   |
| 7          |           | <b>India's Contribution to World</b>                                              | 1                 |
|            | 7.1       | Indian Foundation of Modern Science                                               |                   |

#### Text Books:

1. R.M. Pujari, Pradeep Kolhe, N. R. Kumar, 'Pride of India: A Glimpse into India's Scientific Heritage', Samskrita Bharati Publication.
2. 'Indian Contribution to science', compiled by vijnana bharati.
3. 'Knowledge traditions and practices of India', Kapil Kapoor, Michel Danino, CBSE, India.

#### Reference Books:

1. Dr. Subhash Kak Computation in Ancient India, Mount, Meru Publishing (2016)

**Computer Engineering Department, Indus Institute of Engineering & Technology, Indus University**

**Program - B. Tech (Computer Engineering/Computer Science & Engineering/Information Technology)**

**SEMESTER - III**

| Sr. No. |        | Name of the subject                         | Credit | Teaching Scheme |      |     |             | Evaluation Scheme |     |           |     |       | Segment |
|---------|--------|---------------------------------------------|--------|-----------------|------|-----|-------------|-------------------|-----|-----------|-----|-------|---------|
|         |        |                                             |        | (per week)      |      |     |             | Theory            |     | Practical |     | Total |         |
|         |        |                                             |        |                 |      |     |             | CIE               | ESE | CIE       | ESE | Marks |         |
|         |        |                                             |        | Th.             | Tut. | Pr. | Total (hr.) | Th.               | Th. | Pr.       | Pr. |       |         |
| 1       | MA0311 | Probability, Statistics & Numerical Methods | 4      | 3               | 1    | 0   | 4           | 60                | 40  | 0         | 0   | 100   | BS      |
| 2       | CE0320 | Computer Organization & Architecture        | 3      | 3               | 0    | 0   | 3           | 60                | 40  | 0         | 0   | 100   | ES      |
| 3       | EC0319 | Digital Electronics                         | 4      | 3               | 0    | 2   | 5           | 60                | 40  | 60        | 40  | 200   | ES      |
| 4       | CE0316 | Object Oriented concepts with UML           | 4      | 3               | 0    | 2   | 5           | 60                | 40  | 60        | 40  | 200   | Core    |
| 5       | CE0317 | Database Management System                  | 4      | 3               | 0    | 2   | 5           | 60                | 40  | 60        | 40  | 200   | Core    |
| 6       | SS0301 | Human Values and Professional Ethics        | 2      | 2               | 0    | 0   | 2           | 100               | 0   | 0         | 0   | 100   | HS      |
| 7       | CE0318 | Internship Credit /Online courses/ MOOC     | 2      | 0               | 0    | 0   | 0           | 0                 | 0   | 100       | 0   | 100   | IC      |
|         |        | TOTAL                                       | 23     | 17              | 1    | 6   | 24          | 400               | 200 | 280       | 120 | 1000  |         |

**Subject: Probability, Statistics & Numerical Methods**

**Program: B. Tech CE/CSE/IT**

**Subject Code: MA0311**

**Semester: III**

**Teaching Scheme (Hours per week)**

**Examination Evaluation Scheme (Marks)**

| Lecture | Tutorial | Practical | Credits | University Theory Examination | University Practical Examination | Continuous Internal Evaluation (CIE)-Theory | Continuous Internal Evaluation (CIE)-Practical | Total |
|---------|----------|-----------|---------|-------------------------------|----------------------------------|---------------------------------------------|------------------------------------------------|-------|
| 3       | 1        | 0         | 4       | 40                            | 0                                | 60                                          | 0                                              | 100   |

|               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |          |
|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| <b>Unit 1</b> | <p><b>Basics of Probability:</b><br/>Introduction to Probability, Characteristics of random variable, Probability mass function, cumulative distribution function, probability density function.</p> <p><b>Probability distributions:</b><br/>Discrete distributions: Binomial distribution, Poisson distribution,<br/>Continuous distributions: Normal distribution</p>                                                                                                                                                                                                                                                  | 10 hours |
| <b>Unit 2</b> | <p><b>Statistics:</b><br/>Introduction and application of statistics, types of statistics, testing of hypothesis, Mean, standard deviation, coefficient of variation, F-test, t-test, Chi Square test, Correlation and regression.</p>                                                                                                                                                                                                                                                                                                                                                                                    | 10 hours |
| <b>Unit 3</b> | <p><b>Interpolation</b><br/>Finite differences and Interpolation: Finite differences Forward, Backward &amp; Central difference operators and difference tables. Interpolation, Interpolation Formulae with equal intervals: Newton's forward, Newton's backward, Central difference interpolation by Stirling's formulae<br/>Interpolation Formulae with unequal intervals: Lagrange's &amp; Newton's divided difference interpolation<br/>Numerical Integration: Trapezoidal rule, Simpson's 1/3 rule, Simpson's 3/8 rule.<br/>Numerical differentiation: Using Newton's forward and backward interpolation formula</p> | 12 hours |
| <b>Unit 4</b> | <p><b>Numerical Methods</b><br/>Basic Errors. Solution of Algebraic and Transcendental Equations: Bisection method, Regula-Falsi method, Newton-Raphson method., Convergence condition for these methods, Numerical methods in Linear Algebra: Gauss-Jacobi, Gauss-seidel method<br/>Largest Eigen values and corresponding Eigen vectors: By power method<br/>Numerical Solutions of ordinary differential equations: Taylor's Method, Euler's Method, Improved Euler Method (Heun's Method), Runge-Kutta method of order four</p>                                                                                       | 13 hours |

**Text Book:** B. V. Ramana, “Higher Engineering Mathematics”, Tata McGraw Hill.

**Reference Books:**

1. Erwin Kreyszig, “Advanced Engineering Mathematics” (8th Edition), Wiley Eastern Ltd., New Delhi.
2. Dr. B.S. Grewal, “Higher Engineering Mathematics”, Khanna Publishers, New Delhi
3. Murray Spiegel , “Advanced Mathematics for Engineering & Science: Schaum’s Outline Series”, Tata McGraw Hill Publication
4. Merel C Potter, J.L. Goldberg, “Advanced Engineering Mathematics” (3rd Edition), Oxford India Publication.

**Subject: Computer Organization and Architecture**

**Program: B.Tech Computer Engineering**

**Subject Code: CE0320**

**Semester: III**

| Teaching Scheme (Hours per week) |          |           |         | Examination Evaluation Scheme (Marks) |                                  |                                              |                                                 |       |
|----------------------------------|----------|-----------|---------|---------------------------------------|----------------------------------|----------------------------------------------|-------------------------------------------------|-------|
| Lecture                          | Tutorial | Practical | Credits | University Theory Examination         | University Practical Examination | Continuous Internal Evaluation (CIE)- Theory | Continuous Internal Evaluation (CIE)- Practical | Total |
| 3                                | 0        | 0         | 3       | 40                                    | 0                                | 60                                           | 0                                               | 100   |

### Course Objectives

1. To conceptualize the basics of organizational and architectural issues of a digital computer.
2. To analyze performance issues in processor and memory design of a digital computer.
3. To understand various data transfer techniques in digital computer.
4. To analyze processor performance improvement using parallelism.

## CONTENTS

### UNIT-I

#### **Basic Computer Organization and Data Representation**

[12 hours]

Overview of computer organization, CPU organization components classification of computer architecture, Register, types of register, Bus, types of bus, quantitative techniques in computer design, measuring and reporting performance, Amdahl's Law, number system, fixed point representation, floating point representation.

### UNIT-II

#### **Instruction Set Architecture**

[12 hours]

Instruction, instruction format, instruction execution cycle, instruction timing cycles, ISA, ISA design issue, types of ISA, Accumulator organization, stack organization, memory-memory organization, register memory organization, register-register organization, addressing mode, RISC, CISC, 8085 microprocessors, Architecture, Operations of 8085, Instruction Set for 8085, Addressing Modes of 8085.



## UNIT-III

### **Pipeline**

[12Hours]

What is pipeline, Flynn's taxonomy for Parallel Processing, types of pipeline, Arithmetic Pipeline, Instruction Pipeline, measuring performance of pipeline, types of hazard, structural hazard, data hazard, control hazard, method for avoiding hazard, Vector Processing, Array Processors, Parallel Processing

## UNIT-IV

### **Memory Organization**

[12 Hours]

Memory Hierarchy, types of memory, Main Memory, Auxiliary Memory, Inclusion, Coherence and locality properties, Cache Memory, Organization of cache memory, performance of cache memory with examples, cache memory mapping algorithms, cache optimization techniques, Virtual Memory, demand paging, page replacement algorithms.

### **Course Outcomes**

At the end of this subject, students should be able to:

After successful completion of the course, student will able:

1. To understand and describe the basics of various architectural units of the Computer System
2. To apply the knowledge of combinational and sequential logical circuits to mimic a simple computer architecture
3. To demonstrate the simulations for basic computer operations
4. To recognize the importance of parallelism in computer architecture
5. To understand the basic working of various memory system.
6. This course is the bridge between digital electronics and microprocessor.

### **Text Books:**

1. Computer system Architecture Mano, M. Morris Pearson publication
2. Computer Architecture and Organization Ghoshal, Subrata Pearson publication

### **Reference Books:**

1. Carl Hamacher -Computer Organization, Fifth Edition, Tata McGraw Hill.
2. John P Hayes -Computer Architecture & Organization–McGraw Hill
3. William Stallings-Computer Organization and Architecture, Seventh Edition, Pearson Education

### **Web Resources**

1. <https://nptel.ac.in/courses/106/105/106105163>
2. [https://www.youtube.com/channel/UC2GUBG\\_WsP00O5tXXocwp3Q/videos](https://www.youtube.com/channel/UC2GUBG_WsP00O5tXXocwp3Q/videos)

**Subject: Digital Electronics**

**Program: B. Tech CE/CSE/IT**

**Subject Code: EC0319**

**Semester: III**

**Teaching Scheme (Hours per week)**

**Examination Evaluation Scheme (Marks)**

| Lecture | Tutorial | Practical | Credits | University<br>Theory<br>Examination | University<br>Practical<br>Examination | Continuous<br>Internal<br>Evaluation<br>(CIE)-<br>Theory | Continuous<br>Internal<br>Evaluation<br>(CIE)-<br>Practical | Total |
|---------|----------|-----------|---------|-------------------------------------|----------------------------------------|----------------------------------------------------------|-------------------------------------------------------------|-------|
|         |          |           |         |                                     |                                        |                                                          |                                                             |       |

### **Course Objectives:**

By participating in and understanding all facets of this course a student will:

1. Understand number representation and conversion between different representations in digital electronic circuits.
2. Perform the analysis and design of various digital electronic circuits.
3. Understand concept of Optimization of logic circuits using Karnaugh maps.
4. Analyze logic processes and implement logical operations using combinational logic circuits
5. Analyze logic processes and implement logical operations using sequential logic circuits.
6. Analyze sequential systems in terms of state machines.

## **CONTENTS**

### **UNIT-I**

**[12 hours]**

#### **Number System:**

Decimal, Binary, Octal, Hexadecimal number system, Conversion of numbers from one number system to other, complement method of addition, subtraction using 9's and 10's complement method & 1's and 2's complement method.

**Binary Codes:**

Weighted and Non-weighted code, 8421 BCD code, XS-3 code, Gray code, Binary to Gray conversion, Gray to Binary conversion

**Logic Gates & Boolean Algebra:** AND, OR, NOT, NAND, NOR, X-OR, X-NOR, BUFFER, Axioms and laws of Boolean algebra, D’Morgans theorem, Duality, Reduction of Boolean expression

**UNIT-II****[12 hours]**

**Boolean Algebra - II & Simplification of Boolean Functions:** Converting AND/OR/INVERT logic to NAND/NOR logic, POS and SOP expressions, Simplification of Boolean expression using Karnaugh Map for 2 to 5 variables, Don’t care conditions and Tabulation method

**Combinational Logic:** Introduction, Design Procedure, Code Conversion, Multilevel NAND and NOR circuit

**UNIT-III****[12hours]****Combinational Circuits with MSI & LSI**

The Half-adder, The Full-adder, The Half-subtractor, The Full-Subtractor, Parallel Binary Adders, Binary Subtractor, Adder- Subtractor, BCD adder, Code converters, Parity bit Generators/Checkers, Comparators, Decoders, BCD to 7-Segment Decoders, Encoders, Multiplexers, Applications of Multiplexer, Demultiplexers, Circuit implementation using PLDs (PLA, PAL)

**Flip Flop :**

S-R Flip-flop, JK Flip-flop, D Flip-flop, T Flip-flop, Master-slave Flip-flop, Conversion of Flip flop

**UNIT-IV****[12hours]****Shift Registers, Counters & FSM Design**

**Shift Registers:** Serial-in Serial-out Shift register, Serial-in Parallel-out Shift register, Parallel-in Serial-out Shift register, Parallel-in Parallel-out Shift register

**Counters:** Asynchronous counter, Design of Asynchronous counter, Synchronous counters, Design of Synchronous counter

**FSM Design:** State Diagram, State Table, State Assignment, Moore and Mealy Model

## **Course Outcomes:**

At the end of this subject, students should be able to:

1. Understand number representation and able to perform conversion between different representation in digital electronic circuits.
2. Familiar with basic logic gates and independently or work in team to create logic circuits using logic gates.
3. Remember Boolean algebra and apply basic properties of Boolean algebra to simplify Boolean functions by using the basic Boolean properties.
4. Optimize logic circuits using Karnaugh maps.
5. Analyze logic processes and implement logical operations using combinational logic circuits.
6. Understand concepts of sequential circuits and to analyze sequential systems in terms of state machines.

## **Text Books:**

- 1) Morris Mano, "Digital Logic and Computer Design", Pearson, ISBN 13: 9788177584097

## **Reference Books:**

- 1) Ronald J. Tocci, Gregory L. Moss, "Digital Systems", 10 Ed, Pearson, ISBN 9780135103821
- 2) D.C.Green, "Digital Electronics" 5th Ed., Pearson, 2005, ISBN-9788177580686

## **Web Resources:**

- 1) Digital Circuits & Systems  
<http://nptel.ac.in/courses/117106086/1>
- 2) Circuits and Electronics  
<https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-002-circuits-and-electronics-spring-2007/index.htm>

## LIST OF EXPERIMENTS

| Experiment No. | Title                                                                                                                                                                                                           | Learning Outcomes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1.             | To Verify the behavior of Logic Gates using Truth Table and Familiarization with Digital Integrated Circuits                                                                                                    | <p>Upon successful completion of this course students should be able to:</p> <ol style="list-style-type: none"> <li>1. Implementation for basic logic gates &amp; digital Circuits using ICs.</li> <li>2. Implementation &amp; analyze the operation of medium &amp; high complexity standard combinational circuits like the encoder, decoder, multiplexer, demultiplexer, adder ,subtractor</li> <li>3. Implementation &amp; analyze the operation of a flip-flop and examine relevant timing diagrams</li> <li>4. Implementation &amp; analyze the operation of counters and shift registers</li> </ol> <p>Design and operate practical digital logic circuits</p> |
| 2.             | Familiarization with the Different Portions of the Datasheet for a Digital IC and Using the Datasheet to Gather Relevant Information to Utilize the IC as a Component in another Digital Logic Circuit          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 3.             | Realization of basic gates using Universal Gates.                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 4.             | Verification of Demorgans Theorem.                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 5.             | Implementation of Half Adder & Full Adder Circuits.                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 6.             | Implementation of Half Subtractor & Full Subtractor Circuits                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 7.             | Implementation of Multiplexes (4-1 MUX/8-1 MUX)                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 8.             | Implementation of Decoders (3-8 Decoder/4-16 decoder)                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 9.             | Realization of Flip-Flop using Gates.                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 10.            | Implementation of Shift Registers using Flip Flop. (Serial-in Serial-out Shift register, Serial-in Parallel-out Shift register, Parallel-in Serial-out Shift register, Parallel-in Parallel-out Shift register) |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 11.            | Implementation of Asynchronous Counters ( 4 bit Up/down)                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 12.            | Implementation of Synchronous Counters (4 bit Up/down)                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

**Subject: Object Oriented Concepts with UML**

**Program: B. Tech CE/CSE/IT**

**Subject Code: CE0316**

**Semester: III**

| Teaching Scheme (Hours per week) |          |           |         | Examination Evaluation Scheme (Marks) |                                  |                                              |                                                 |       |
|----------------------------------|----------|-----------|---------|---------------------------------------|----------------------------------|----------------------------------------------|-------------------------------------------------|-------|
| Lecture                          | Tutorial | Practical | Credits | University Theory Examination         | University Practical Examination | Continuous Internal Evaluation (CIE)- Theory | Continuous Internal Evaluation (CIE)- Practical | Total |
| 3                                | 0        | 2         | 4       | 40                                    | 40                               | 60                                           | 60                                              | 200   |

### Course Objectives:

1. To learn the fundamental programming concepts and methodologies which are essential to building good C/C++ programs.
2. To write reusable modules, functions and classes as per Object Oriented Concepts.
3. To enhance employment of students, making good use of the object-oriented programming paradigm to simplify the design and implementation process
4. To encourage the practical problem solving skills.
5. To code, document, test, and implement a well-structured, robust computer program using the C/C++ programming language.

## CONTENTS

### UNIT-I

[12 hours]

#### Introduction to C++:

Concepts of OOP: Introduction OOP, Procedural Vs. Object Oriented Programming, Principles of OOP, Benefits and applications of OOP C++ Basics: Overview, Program structure, namespace, identifiers, variables, constants, enum, operators, typecasting, control structures C++ Functions: Simple functions, Call and Return by reference, Inline functions, Macro Vs. Inline functions, Overloading of functions, default arguments, friend functions

## **UNIT-II**

[12 hours]

### **Objects and classes:**

Basics of object and class in C++, Private, protected and public Members, static data and static function, Constructors and their types, Destructors, Arrays & Strings: A standard C++ string class. Operator Overloading: Overloading unary and binary operators, Operator Overloading with friend function, Data Conversion, type conversion, class to class, basic to class, class to basic.

## **UNIT-III**

[12 hours]

### **Inheritance:**

Concept of Inheritance, types of inheritance: single, multiple, multilevel, hierarchical, hybrid, protected members, overriding, virtual base class, constructor in derived classes

### **Polymorphism:**

Pointers in C++, Pointers and Objects, this pointer, virtual and pure virtual functions, implementing polymorphism I/O management: Concept of streams, cin and cout objects, C++ stream classes, Unformatted and formatted I/O, manipulators

## **UNIT-IV**

[12 hours]

### **File management:**

File stream, C++ File stream classes, File management functions, File modes, Binary and random files

### **Object-oriented Design:**

Object modeling using UML, Three models, Class Model (Object and Class Diagram), State model (state Diagram) and Interaction model (Use case diagrams, Activity diagrams, Interaction diagrams).

### **Course Outcomes:**

At the end of this subject, students should be able to:

1. Understand the difference between the top-down and bottom-up approach.
2. Describe the object-oriented programming approach in connection with C++.
3. Illustrate the process of data file manipulations using C++.
4. Apply the concepts of object-oriented programming.
5. Apply virtual and pure virtual function & complex programming situations.
6. Design and implement C++ programs for complex problems, making good use of the features of the language such as classes, inheritance and templates.

**Text Books:**

1. Object oriented Programming with C++, Tata Mc Graw Hill Publication Co. Ltd, Fourth Edition, 2000, ISBN: 97800746203802)
2. Object oriented programming in turbo C++, Robert Lefore, Galgotia Publication Pvt. Ltd. First Edition, 1994, ISBN9788185623221

**Reference Books:**

1. The Complete Reference C++, Herbert Schildt, Tata Mcgraw Hill Publication, Fourth Edition, ISBN-10:00704118322)
2. The C++ programming language, Bjarne Stroustrup, Addison, Fourth Edition, ISBN-10: 0321563840

**Web Resources**

1. <https://www.youtube.com/watch?v=tFYRTWFXSgY>
2. <https://www.youtube.com/watch?v=8fDao3MBbwk>
3. <https://www.youtube.com/watch?v=zagx5hdXBLw>

**LIST OF EXPERIMENTS**

| <b>Experi<br/>ment.<br/>No.</b> | <b>Title</b>                                                                                                                                                                                          | <b>Learning Outcomes</b>                                        |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|
| 1                               | Basics of programming                                                                                                                                                                                 | To understand how C++ improves C with object-oriented features. |
| 2                               | 2.1 Write a program to calculate the area of circle, rectangle and square using function overloading.<br><br>2.2 Write a program to demonstrate the use of default arguments in function overloading. | To learn how to overload functions and operators in C++.        |



|   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                    |
|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|
|   | 2.3 Write a program to demonstrate the use of returning a reference variable.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                    |
| 3 | <p>3.1 Create a class student which stores the detail about roll no, name, marks of 5 subjects, i.e. science, Mathematics, English, C++. The class must have the following:</p> <ul style="list-style-type: none"> <li>• Get function to accept value of the data members.</li> <li>• Display function to display values of data members.</li> <li>• Total function to add marks of all 5 subjects and store it in the data members named total.</li> </ul> <p>3.2 Create a function power() to raise a number m to power n. the function takes a double value for m and int value for n, and returns the result correctly. Use the default value of 2 for n to make the function calculate squares when this argument is omitted. Write a main that gets the values of m and n from the user to test the function.</p> <p>3.3 Write a basic program which shows the use of scope resolution operator.</p> <p>3.4 Write a C++ program to swap the value of private data members from 2 different classes.</p> | To learn how to design C++ classes for code reuse.                 |
| 4 | <p>4.1 Write a program to illustrate the use of this pointer.</p> <p>4.2 An election is contested by five candidates. The candidates are numbered 1 to 5 and the voting is done by marking the candidate number on the ballot paper. Write a program to read the ballots and count the votes cast for each candidate using an array variable count. In case a number is read outside the range of 1 to 5, the ballot should be considered as a 'spoilt ballot' and the program should also count the number of spoilt ballots.</p> <p>4.3 Write a program to call member functions of class in the main function using pointer to object and pointer to member function.</p>                                                                                                                                                                                                                                                                                                                                  | To learn how to design C++ pointers                                |
| 5 | <p>5.1 Using friend function find the maximum number from given two numbers from two different classes. Write all necessary functions and constructors for the program.</p> <p>5.2 Using a friend function, find the average of three numbers from</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | To learn how to implement constructors and class member functions. |

|   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                         |
|---|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|
|   | <p>three different classes. Write all necessary member functions and constructor for the classes.</p> <p>5.3 Define currency class which contains rupees and paisa as data members. Write a friend function named AddCurrency ( ) which add 2 different Currency objects and returns a Currency object. Write parameterized constructor to initialize the values and use appropriate functions to get the details from the user and display it.</p> <p>5.4 Create Calendar class with day, month and year as data members. Include default and parameterized constructors to initialize a Calendar object with a valid date value. Define a function AddDays to add days to the Calendar object. Define a display function to show data in “dd/mm/yyyy” format.</p>                                                                                                                                                                                                                                                                                                    |                                                                         |
| 6 | <p>6.1 Create a class named ‘String’ with one data member of type char *, which stores a string. Include default, parameterized and copy constructor to initialize the data member. Write a program to test this class.</p> <p>6.2 Write a base class named Employee and derive classes Male employee and Female Employee from it. Every employee has an id, name and a scale of salary. Make a function ComputePay (in hours) to compute the weekly payment of every employee. A male employee is paid on the number of days and hours he works. The female employee gets paid the wages for 40 hours a week, no matter what the actual hours are. Test this program to calculate the pay of employee.</p> <p>6.3 Create a class called scheme with scheme_id, scheme_name, outgoing_rate, and message charge. Derive customer class form scheme and include cust_id, name and mobile_no data. Define necessary functions to read and display data. Create a menu driven program to read call and message information for a customer and display the detail bill.</p> | To learn how to implement copy constructors and class member functions. |
| 7 | 7.1 Write a program with use of inheritance: Define a class publisher that stores the name of the title. Derive twoclasses book and tape, which inherit publisher. Book class contains member data called                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | To learn how containment and inheritance promote code reuse in C++.     |

|   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                             |
|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|
|   | <p>page no and tape class contain time for playing. Define functions in the appropriate classes to get and print the details.</p> <p>7.2 Create a class account that stores customer name, account no, types of account. From this derive classes cur_acc and sav_acc to include necessary member function to do the following:<br/> • Accepts deposit from customer and update balance<br/> • Compute and Deposit interest<br/> • Permit withdrawal and Update balance.</p> <p>7.3 Write a base class named Employee and derive classes Male employee and Female Employee from it. Every employee has an id, name and a scale of salary. Make a function ComputePay (in hours) to compute the weekly payment of every employee. A male employee is paid on the number of days and hours he works. The female employee gets paid the wages for 40 hours a week, no matter what the actual hours are. Test this program to calculate the pay of employee.</p>                                                                                                                                                                                                                                                                                                                                              |                                                                                             |
| 8 | <p>8.1 Create a class vehicle which stores the vehiclno and chassiso as a member. Define another class for scooter, which inherits the data members of the class vehicle and has a data member for a storing wheels and company. Define another class for which inherits the data member of the class vehicle and has a data member for storing price and company. Display the data from derived class. Use virtual function.</p> <p>8.2 Create a base class shape. Use this class to store two double type values that could be used to compute the area of figures. Derive two specific classes called triangle and rectangle from the base shape. Add to the base class, a member function get_data() to initialize the base class data members and another member function display_area() to compute and display the area of figures. Make display_area() as a virtual function and redefine this function in the derived class to suit their requirements.</p> <p>8.3 Write a program to demonstrate the use of pure virtual function.</p> <p>8.4 For multiple inheritance, write a program to show the invocation of constructor and destructor.</p> <p>8.5 Create a class string with character array as a data member and write a program to add two strings with use of operator overloading</p> | To learn how inheritance and virtual functions implement dynamic binding with polymorphism. |

|    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                          |
|----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|
|    | <p>concept.</p> <p>8.6 Create a class distance which contains feet and inch as a data member. Overhead = =, &lt;and&gt; operator for the same class. Create necessary functions and constructors too.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                          |
| 9  | <p>9.1 Create a class MARIX of size mxn. Overload + and –operators for addition and subtraction of the MATRIX.</p> <p>9.2 Define a class Coord, which has x and y coordinates as its data members. Overload ++and –operators for the Coord class. Create both its prefix and postfix forms.</p> <p>9.3 Create one class called Rupees, which has one member data to store amount in rupee and create another class called Paise which has member data to store amount in paise. Write a program to convert one amount to another amount with use of type conversion.</p> <p>9.4 Create two classes Celsius and Fahrenheit to store temperature in terms of Celsius and Fahrenheit respectively. Include necessary functions to read and display the values. Define conversion mechanism to convert Celsius object to Fahrenheit object and vice versa. Show both types of conversions in main function.</p> | To learn how to overload functions and operators in C++.                 |
| 10 | <p>10.1 Write a program to create a function template for finding maximum value contained in an array.</p> <p>10.2 Write a program to create a class template for the ‘Array’ class.</p> <p>10.3 Create a template for the bubble sort function.</p> <p>10.4 Write a program to illustrate the use of insertion and extraction operators for Text mode Input/Output.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | To learn how to design and implement generic classes with C++ templates. |
| 11 | <p>11.1 Write a program to illustrate the use of put(), get() and getline() functions for Text mode Input/Output.</p> <p>11.2 Write a program to illustrate the use of read() and write()</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | To learn how to design and implement files with C++.                     |

functions for Binary mode Input/Output.

11.3 Write a program to illustrate the use of manipulators in file handling.8. Write a program to illustrate the use of file pointer manipulation functions.

11.4 Write down a program to Copy source file 'source.txt' to destination file.

11.5 A file contains a list of telephone numbers in the following format:

a) Ram 47890

b) Krishna 878787

c) -----

d) -----

The names contain only one word and the names and telephone numbers are separated by white space. Write a Program to read the tel.dat file and display the content. The names should be left justified and the number right-justified.



**Subject: Database Management System**

**Program: B. Tech CE/CS/IT**

**Subject Code: CE0317**

**Semester: III**

**Teaching Scheme (Hours per week)**

**Examination Evaluation Scheme (Marks)**

| Lecture | Tutorial | Practical | Credits | University Theory Examination | University Practical Examination | Continuous Internal Evaluation (CIE)- Theory | Continuous Internal Evaluation (CIE)- Practical | Total |
|---------|----------|-----------|---------|-------------------------------|----------------------------------|----------------------------------------------|-------------------------------------------------|-------|
| 3       | 0        | 2         | 4       | 40                            | 40                               | 60                                           | 60                                              | 200   |

### **Course Objectives:**

1. Transform an information model into a relational database schema and to use a data definition language and/or utilities to implement the schema using a DBMS.
2. Design and implement a database schema for a given problem-domain.
3. Understand Functional Dependency and Functional Decomposition and Normalize a database
4. Formulate query, using SQL, solutions to a broad range of query and data update problems.
5. To design and build a simple database system and demonstrate competence with the fundamental tasks involved with modeling, designing, and implementing a DBMS for skill enhancement.

## **CONTENTS**

### **UNIT-I**

**[12 hours]**

**Introductory concepts of DBMS:** Introduction and applications of DBMS, Purpose of data base, Data, Independence, Database System architecture- levels, Mappings, Database, users and DBA

**Entity-Relationship model :** Basic concepts, Design process, constraints, Keys, Design issues, E-R diagrams, weak entity sets, extended E-R features – generalization, specialization, aggregation, reduction to E-R database schema

## UNIT-II

[12 hours]

**Relational Model:** Structure of relational databases, Domains, Relations, Relational algebra – fundamental operators and syntax, relational algebra queries, tuple relational calculus

**Relation Database Design:** Functional Dependency – definition, trivial and non-trivial FD, closure of FDset, closure of attributes, irreducible set of FD, Normalization – 1NF, 2NF, 3NF, composition using FD- dependency preservation, BCNF, Multivalued dependency, 4NF, Join dependency and 5NF

## UNIT-III

[12 hours]

**Transaction Management and Security:**

Transaction concepts, properties of transactions, serializability of transactions, testing for serializability, System recovery, Two- Phase Commit protocol, Recovery and Atomicity, Log-based recovery, concurrent executions of transactions and related problems, Locking mechanism, solution to concurrency related problems, deadlock, , two-phase locking protocol, Isolation, Intent locking

**Security:** Introduction, Discretionary access control, Mandatory Access Control, Data Encryption

## UNIT-IV

[12 hours]

**SQL & PL/SQL Concepts:**

**SQL:** Basics of SQL, DDL, DML, DCL, structure – creation, alteration, defining constraints – Primary key, foreign key, unique, not null, check, IN operator, aggregate functions, Built-in functions –numeric, date, string functions, set operations, sub-queries, correlated sub-queries, join, Exist, Any, All , view and its types., transaction control commands.

**PL/SQL:** Cursors, Stored Procedures, Stored Function, Database Triggers

## **Course Outcomes:**

At the end of this subject, students should be able to:

1. Identify the basic concepts and various data model used in database design ER modeling concepts and architecture used.
2. Apply relational database theory and be able to describe relational algebra expression, tuple and domain relation expression fro queries
3. Recognize and identify the use of normalization and functional dependency, indexing and hashing technique used in database design.
4. Apply and relate the concepts of Ttransaction, Concurrency and Recovery techniques in database.
5. Utilize the knowledge of basics of SQL and construct queries using SQL. Perform PL/SQL programming using concept of Cursor Management, Error Handling, Package and Triggers.
6. Justify database solution to an information technology problem. Working on existing database systems, designing of database, creating relational database, analysis of table design.

## **Text Books:**

1. Database System Concepts, Abraham Silberschatz, Henry F. Korth & S.Sudarshan, McGraw Hill.
2. SQL- PL/SQL by Ivan Bayross.

## **Reference Books:**

- 1) An Introduction to Database Systemsby C. J. Date.
- 2) Raghuram Ramakrishnan and Johannes Gehrke, Database Management Systems (3/e), McGraw Hill, 2003.
- 3) Peter Rob and Carlos Coronel, Database Systesm- Design, Implementation and Management (7/e), Cengage Learning, 2007.
- 4) Ramez Elmasri and Shamkant B. Navathe, Fundamentals of Database Systems (5/e), Pearson Education, 2008.
- 5) Understanding SQL by Martin Gruber, BPB.



## Web Resources


1. <https://beginnersbook.com/2015/04/dbms-tutorial/>
2. <https://www.jbiet.edu.in/coursefiles/cse/HO/cse2/DBMSI-III.pdf>
3. <https://www.geeksforgeeks.org/dbms/>
4. [https://mrcet.com/downloads/digital\\_notes/IT/Database%20Management%20Systems.pdf](https://mrcet.com/downloads/digital_notes/IT/Database%20Management%20Systems.pdf)
5. <https://lecturenotes.in/subject/38/database-management-system-dbms>

## LIST OF PRACTICALS

| Practical No. | Title                                                                                                                                                                                                                                                               | Learning Outcomes |
|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| 1             | Introduction to SQL. Data Definition in SQL (CREATE, ALTER and DROP), Data Types.                                                                                                                                                                                   | CO5               |
| 2             | Draw E-R diagram and convert entities and relationships to relation table for a given scenario. A. Two assignments shall be carried out i.e. consider two different scenarios (eg. bank, college) B. Write relational algebra queries for a given set of relations. | CO1,CO2           |
| 3             | Design a Database and create required tables. For e.g. Bank, College Database.                                                                                                                                                                                      | CO5,CO6           |
| 4             | Perform the following: a. Viewing all databases, Creating a Database, Viewing all Tables in a Database, Creating Tables (With and Without Constraints), Inserting/Updating/Deleting Records in a Table, Saving (Commit) and Undoing (rollback)                      | CO5,CO6           |
| 5             | Apply the constraints like Primary Key , Foreign key, NOT NULL to the tables.                                                                                                                                                                                       | CO5               |
| 6             | Perform the following: a. Altering a Table, Dropping/Truncating/Renaming Tables, Backing up / Restoring a Database.                                                                                                                                                 | CO5               |

|    |                                                                                                                                                                                                                                                                                                                               |     |
|----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| 7  | For a given set of relation schemes, create tables and perform the following Simple Queries, Simple Queries with Aggregate functions, Queries with Aggregate functions (group by and having clause), Queries involving- Date Functions, String Functions , Math Functions                                                     | CO5 |
| 8  | Join Queries- Inner Join, Outer Join Subqueries- With IN clause, With EXISTS clause                                                                                                                                                                                                                                           | CO5 |
| 9  | For a given set of relation tables perform the following: Creating views (with and without check option), Dropping views, Selecting from a view                                                                                                                                                                               | CO5 |
| 10 | Perform the following operation for demonstrating the insertion , updation and deletion using the referential integrity constraints.                                                                                                                                                                                          | CO5 |
| 11 | Write a PL/SQL block to insert record into emp2table. Accept value at runtime.                                                                                                                                                                                                                                                | CO5 |
| 12 | Write a PL/SQL block to reserve a given number.                                                                                                                                                                                                                                                                               | CO5 |
| 13 | Write a PL/SQL block to check given num is odd or even.                                                                                                                                                                                                                                                                       | CO5 |
| 14 | Write a PL/SQL block to accept id of employee (emp2 table) from user and fetch a record of that employee. Check the salary and update the salary Column as follows:<br>a. If salary >10000and salary<=20000, then salary = salary+30% of salary.<br>b. If salary>20000 and salary<=30000, then salary =salary+ 40% of salary. | CO5 |
| 15 | Write a PL/SQL block that will display the information of the first 5 employee holding the highest salary of emp2 table                                                                                                                                                                                                       | CO5 |
| 16 | Write a PL/SQL block that merge ft_work and pt_work. Fetch name of emp from pt_work, check if it is in ft_work. If it is not there then insert that record in ft_work, otherwise display appropriate message.                                                                                                                 | CO5 |
| 17 | Create trigger on supplier table which allow access between 9 AM to 5 PM only.                                                                                                                                                                                                                                                | CO5 |

|    |                                                                                                                                                                       |         |
|----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| 18 | Create trigger on Supplier Detail on update or insert of Sname to convert Sname into capital letter.                                                                  | CO5     |
| 19 | Create a stored procedure which accept CNUM from the user and print that order is placed by that customer or not. Also write a PL/SQL block for using this procedure. | CO5     |
| 20 | Create a database.                                                                                                                                                    | CO5,CO6 |

|                                                                                                                                           |                 |                  |                |                                                                                                            |                                         |                                                     |                                                        |              |
|-------------------------------------------------------------------------------------------------------------------------------------------|-----------------|------------------|----------------|------------------------------------------------------------------------------------------------------------|-----------------------------------------|-----------------------------------------------------|--------------------------------------------------------|--------------|
|  <b>इंजानेन प्रकाशते जगत्</b><br><b>INDUS UNIVERSITY</b> |                 |                  |                | <b>INDUS INSTITUTE OF TECHNOLOGY &amp; ENGINEERING</b><br><b>Constituent Institute of Indus University</b> |                                         |                                                     |                                                        |              |
| <b>Subject: Human Values and Professional Ethics</b>                                                                                      |                 |                  |                |                                                                                                            |                                         |                                                     |                                                        |              |
| <b>Program: B. Tech CE/CS/IT</b>                                                                                                          |                 |                  |                | <b>Subject Code: SS0301</b>                                                                                |                                         |                                                     | <b>Semester: III</b>                                   |              |
| <b>Teaching Scheme (Hours per week)</b>                                                                                                   |                 |                  |                | <b>Examination Evaluation Scheme (Marks)</b>                                                               |                                         |                                                     |                                                        |              |
| <b>Lecture</b>                                                                                                                            | <b>Tutorial</b> | <b>Practical</b> | <b>Credits</b> | <b>University Theory Examination</b>                                                                       | <b>University Practical Examination</b> | <b>Continuous Internal Evaluation (CIE)- Theory</b> | <b>Continuous Internal Evaluation (CIE)- Practical</b> | <b>Total</b> |
| <b>2</b>                                                                                                                                  | <b>0</b>        | <b>0</b>         | <b>2</b>       | <b>0</b>                                                                                                   | <b>0</b>                                | <b>100</b>                                          | <b>0</b>                                               | <b>100</b>   |

### Course Objectives:

1. To Facilitates arriving at correct decisions because, correct decisions form basis for success anywhere and in any venture.
2. To decode Success.
3. To achieve Emotional stability through righteous earning of wealth.
4. To understand and discriminate between ethical and unethical practices.
5. To study moral issues and critical decision making.
6. To understand the role of ethics in promoting sustainable

### Course Contents:

Music with invocation of thought process, Decoding success: Skill or a trait or both?, Decoding self to decode success, Understanding Self-Confidence, Self- respect, Self-esteem, False prestige towards removal of Identity crisis, Components of self (mind, body, spirit), Idea of self (Which of the three am I?), Mind and conscience, Psychosomatic (mind over matter) effect and disease, Effect of ethics and values on well being, Handling insecurity, anxiety and pressure, Handling failures, guilt, Status and success, Success redefined., Happiness being the key to success and not vice-versa, From self to society to global-sustainability.

### Course Outcomes:

CO1: Identify the ways to decode success and redefining it for global sustainability [BT-1]

CO2: Understand the Difference between the ethical and unethical practices in surrounding and explore the reasons behind them.[BT-2]

CO3: Apply correct decisions to form basis for success in all ventures of life[BT-3]

CO4: Analyse various components of self ( mind, body, soul) [BT-4]

CO5: Estimate the Emotional stability through righteous earning of wealth[BT5]

CO6: Develop the thought process for promoting sustainable practices in multiple domains of life and society. [BT6]

**Books:**

- 1) The Mahabharata box set - Bibek Debroy, ISBN-13: 978-0143424789
- 2) The Valmiki Ramayana, Set of 3 Vols - Bibek Debroy, ISBN-13: 978-0143441144
- 3) Honest truth of dishonesty Dan Ariely, Harper (2012), ISBN: 0062183591 / 9780062183590
- 4) “Seven Spiritual Laws of Success”, Deepak Chopra, Amber-Allen Publisher, ISBN: 9782290339954
- 5) “The Vedas and Upanishads for Children”, Roopa pai,Hachette India, ISBN:9789351952961
- 6) The Gita : for Children - Roopa Pai, Hachette India Local; Latest edition, ISBN: 9789351950127
- 7) Go for Growth, Narsinhbhai K Patel, Ahmedabad Management Association
- 8) Be a Winner, Narsinhbhai K Patel, Ahmedabad Management Association
- 9) Swadharma: Puranic stories for childrena
- 10) Pearls of Wisdom from Hinduism – Nicholas Sutton and Hanuman Dass
- 11) The Power of Dharma: The Universal Moral Principle - Nicholas Sutton and Hanuman Dass
- 10) Two Vedic Tales: Stories from The Mahabharata and the Puranas
- 11) Inside Job (documentary) - Matt Damon (Actor), Gylfi Zoega (Actor), & 1 More Rated: U/A (Parental Guidance) Format: Blu-ray
- 12) Ethical and Spiritual Values in Indian Scriptures - Ved Prakash Bhatia
- 13) The Upanishads Demystified : Ethical values - Ved Prakash Bhatia

- 14) Lying - Sam Harris
- 15) Free Will - Sam Harris
- 16) Deep Work: Rules for Focused Success in a Distracted World Paperback –Cal Newport
- 17) The Elephant in the Brain: Hidden Motives in Everyday Life - Kevin Simler and Robin Hanson
- 18) Trust Me I'm Lying: Confessions of a Media Manipulator - Ryan Holiday
- 19) Who's in Charge?: Free Will and the Science of the Brain - Michael S. Gazzaniga
- 20) The Ethical Brain: The Science of Our Moral Dilemmas - Michael S. Gazzaniga
- 21) Misbehaving Paperback – by Richard H Thaler

**Computer Engineering Department, Indus Institute of Engineering & Technology, Indus University**  
**Program - B. Tech (Computer Engineering/Computer Science & Engineering/Information Technology)**

| <b>SEMESTER - IV</b> |        |                             |               |                        |             |            |                       |                          |            |                  |            |                |              |
|----------------------|--------|-----------------------------|---------------|------------------------|-------------|------------|-----------------------|--------------------------|------------|------------------|------------|----------------|--------------|
| <b>Sr.<br/>No.</b>   |        | <b>Name of the subject</b>  | <b>Credit</b> | <b>Teaching Scheme</b> |             |            |                       | <b>Evaluation Scheme</b> |            |                  |            | <b>Segment</b> |              |
|                      |        |                             |               | <b>(per week)</b>      |             |            |                       | <b>Theory</b>            |            | <b>Practical</b> |            |                | <b>Total</b> |
|                      |        |                             |               |                        |             |            |                       | <b>CIE</b>               | <b>ESE</b> | <b>CIE</b>       | <b>ESE</b> |                | <b>Marks</b> |
|                      |        |                             |               | <b>Th.</b>             | <b>Tut.</b> | <b>Pr.</b> | <b>Tot.<br/>(hr.)</b> | <b>Th.</b>               | <b>Th.</b> | <b>Pr.</b>       | <b>Pr.</b> |                |              |
| 1                    | CE0425 | ICT Tools and Technology    | 2             | 0                      | 1           | 2          | 3                     | 0                        | 0          | 100              | 0          | 100            | ES           |
| 2                    | CE0417 | Data Structure & Algorithms | 4             | 3                      | 0           | 2          | 5                     | 60                       | 40         | 60               | 40         | 200            | Core         |
| 3                    | CE0418 | Operating System            | 4             | 3                      | 0           | 2          | 5                     | 60                       | 40         | 60               | 40         | 200            | Core         |
| 4                    | BB0311 | Management for Engineers    | 2             | 2                      | 0           | 0          | 2                     | 60                       | 40         | 0                | 0          | 100            | HS           |
| 5                    | CE0421 | Core Java Programming       | 4             | 3                      | 0           | 2          | 5                     | 60                       | 40         | 60               | 40         | 200            | Core         |
| 6                    |        | <i>Open Elective 4</i>      | 3             | 3                      | 0           | 0          | 3                     | 60                       | 40         | 0                | 0          | 100            | OE           |
| 7                    |        | <i>Open Elective 5</i>      | 3             | 3                      | 0           | 0          | 3                     | 60                       | 40         | 0                | 0          | 100            | OE           |
|                      |        | <b>TOTAL</b>                | <b>22</b>     | <b>17</b>              | <b>1</b>    | <b>8</b>   | <b>26</b>             | <b>360</b>               | <b>240</b> | <b>280</b>       | <b>120</b> | <b>1000</b>    |              |

**Subject: ICT Tools and Technology**

**Program: B. Tech CE/CS/IT**

**Subject Code: CE0425**

**Semester: IV**

**Teaching Scheme (Hours per week)**

**Examination Evaluation Scheme (Marks)**

| Lecture | Tutorial | Practical | Credits | University Theory Examination | University Practical Examination | Continuous Internal Evaluation (CIE)- Theory | Continuous Internal Evaluation (CIE)- Practical | Total |
|---------|----------|-----------|---------|-------------------------------|----------------------------------|----------------------------------------------|-------------------------------------------------|-------|
| 0       | 1        | 2         | 2       | 0                             | 0                                | 0                                            | 100                                             | 100   |

### Course Objectives:

1. To understand, learn and implement ICT tools for Quizzing, Creative creations-animations, presentations that enhance the employability skills of students.
2. To familiarize the concept of Office Automation Tools and Technologies
3. To explore open source software, freeware, application software that helps in skill development.
4. To gain knowledge of Virtual labs and Virtual Reality in Learning.
5. Exposure of various educational Resources in learning and Online Certification Courses that enhances entrepreneurship skills in students.

### CONTENTS

**Information and Communication Technology(ICT)-** Introduction, models of access to ICT, advantages and Disadvantages of ICT tools, Key issues to remember concerning to the importance of ICT in education, ICT tools for developing literacy, ICT tools for Quizzing/Testing/Gaming-Google forms, BookWidgets, Classmarker, Educaplay, ICT tool for presentation-Prezi, ICT tools for creative creations-Wordle, Canva, ICT tools for online collaboration-Google spreadsheets, Google docs, ICT tools for Brainstorm/Organizing-Xmind, Timeglinder, other important tools for ICT-Diiigo, iRubric, PDF-splitter, merger, converter.

**Office Automation Tools and Technologies-** Document Editor - Mail merge with E-mail address lists /Databases Spreadsheet – Referencing, Relative, Absolute and Mixed, Various charts in detail, VLOOKUP, HLOOKUP, Pivot Table Use of E-mail clients – MS Outlook, Mozilla Thunderbird- Installation and Configuration.



**Open Source Software**-The philosophy of OSS, commercial software vs OSS, free software vs freeware,**OSI-approved Open Source License:** Introduction to Python, Installation and Working with Python, Writing and executing python programs, comments, keywords, identifiers, built - in data types, variables, literals, sequences, sets, operators, precedence and associativity , type conversion, expression evaluation, simple input - output statements.Control Statements, Strings: creating, indexing, slicing, manipulating, operations, testing methods, Lists, Tuples and Dictionaries: creating, indexing, slicing, manipulating, operations, methods.

**Pedagogical integration of emerging ICT strategy in Learning**-Techniques for various learning Mode, Integration of Open Educational Resources, Virtual Labs, Video Tutorial & Interactive Video Tutorial, Virtual Reality in Teaching and Learning, Integration of Open Educational Resources for Research Blended and Flipped Learning, Online Certification Courses- MOOC, Udemy, Coursera, NPTEL- Swayam portal.

### **Course Outcomes:**

At the end of this subject, students should be able to:

1. Demonstrate their ability to use the state of the art technologies and tools including Free and Open Source Software (FOSS) tools in developing software.
2. Apply current techniques, skills and modern engineering tools necessary for computing practice.
3. Analyze the factors for designing new system software.
4. Identify and apply for certification courses on various online platforms that enhance employability skills of students.
5. Foster innovation in design of products, processes or systems by using different tools and technologies.
6. Distinguish different software into different categories.

### **Reference Books:**

1. Information and Communication Technologies and Real-Life Learning 2005 Edition Springer Publication by Tom van Weert Arthur Tatnall.
2. Towards Engineering Free/Libre Open Source Software (FLOSS) Ecosystems for Impact and Sustainability by Fitzgerald, Brian, Mockus, Audris, Zhou, Minghui.
3. Open Sources: Voices from the Open Source Revolution 1st Edition January 1999.

4. Advances in Information and Communication Technologies by Editors: Ilchenko, Mykhailo, Uryvsky, Leonid, Globa, Larysa (Eds.)
5. John V Guttag. "Introduction to Computation and Programming Using Python", Prentice Hall of India

**Web Resources:**

1. [https://onlinecourses.swayam2.ac.in/ntr20\\_ed04/preview](https://onlinecourses.swayam2.ac.in/ntr20_ed04/preview)
2. [https://www.researchgate.net/publication/309740093\\_Blended\\_learning\\_pedagogy\\_learning\\_styles\\_and\\_assessment\\_activities\\_in\\_the\\_classroom](https://www.researchgate.net/publication/309740093_Blended_learning_pedagogy_learning_styles_and_assessment_activities_in_the_classroom)

**LIST OF EXPERIMENTS**

| Experiment No. | Title                                                                                                                                                                                                                                                                     | Learning Outcomes |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| 1              | Prepare a MCQ based questionnaire on health and fitness using Google Forms.                                                                                                                                                                                               | CO -1,3           |
| 2              | Make a presentation using Prezi tool on any given topic                                                                                                                                                                                                                   | CO-2,5            |
| 3              | Prepare a memory game / crossword puzzles/ word search using Educaplay                                                                                                                                                                                                    | CO -1,3           |
| 4              | Make a photo collage and an animated video with transition effects using Canva.                                                                                                                                                                                           | CO-1,3            |
| 5              | Install and configure Mozilla Thunderbird.                                                                                                                                                                                                                                | CO-2,5            |
| 6              | Prepare an assignment using Mail Merge. You are required to write a cover letter that describes your professional qualifications for a job as Assistant Engineer. Please limit your cover letter to one page, and your number of addresses in the data source file to 15. | CO-5              |
| 7              | Write a Python program to print the calendar of a given month and year.                                                                                                                                                                                                   | CO-1,6            |

|    |                                                                                                                                                                                            |        |
|----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|
| 8  | <p>Write a Python program to check whether a specified value is contained in a group of values.</p> <p>Test Data :<br/> 3 -&gt; [1, 5, 8, 3] : True<br/> -1 -&gt; [1, 5, 8, 3] : False</p> | CO-2,3 |
| 9  | <p>Write a Python program which accepts a sequence of comma-separated numbers from user and generate a list and a tuple with those numbers.</p>                                            | CO-2,6 |
| 10 | <p>Write a Python program to display the first and last colors from the following list.[orange, purple, red, yellow, blue]</p>                                                             | CO-1,3 |
| 11 | <p>Explore V labs-IIT Bombay and IIT-KGP</p>                                                                                                                                               | CO-4   |
| 12 | <p>One Online certification course on Udemy/ Coursera/ NPTEL.</p>                                                                                                                          | CO-4   |

**Subject: Data Structure & Algorithms**

**Program: B. Tech CE/CS/IT**

**Subject Code: CE0417**

**Semester: IV**

| Teaching Scheme (Hours per week) |          |           |         | Examination Evaluation Scheme (Marks) |                                  |                                              |                                                 |       |
|----------------------------------|----------|-----------|---------|---------------------------------------|----------------------------------|----------------------------------------------|-------------------------------------------------|-------|
| Lecture                          | Tutorial | Practical | Credits | University Theory Examination         | University Practical Examination | Continuous Internal Evaluation (CIE)- Theory | Continuous Internal Evaluation (CIE)- Practical | Total |
| 3                                | 0        | 2         | 4       | 40                                    | 40                               | 60                                           | 60                                              | 200   |

### Course Objectives:

1. To enable an efficient storage of data for an easy access.
2. To understand concepts about searching and sorting techniques
3. To empower the student in writing algorithms to solve problems using step by step approach with the help of fundamental data structures.
4. To develop skills in data protection and management.
5. To enhance skills to pick out the underlying algorithms in real-world problems and solve them efficiently.

## CONTENTS

### UNIT-I

[12 Hours]

#### **INTRODUCTION TO DATA STRUCTURE:**

Definition, classification of data structure, Examples of data structure. Searching and Sorting: Various sorting techniques: Selection sort -bubble sort -Quick sort, Merge sorting. Sequential searching, Binary searching.

### UNIT-II

[12 Hours]

#### **LINEAR DATA STRUCTURE:**

Representation of arrays, Applications of arrays, Stack: Stack-Definitions & Concepts, Operations On Stacks, Applications of Stacks, Polish Expression, Reverse Polish Expression And Their Compilation, Recursion, Tower of Hanoi, Queue: Representation Of Queue, Operations On Queue, Circular Queue, Priority Queue, Array, Double Ended Queue, Applications of Queue, Linked List: Singly Linked List, Doubly Linked list, Circular linked list ,Linked

implementation of Stack, Linked implementation of Queue, Applications of linked list.

### **UNIT-III**

**[12 Hours]**

#### **NONLINEAR DATA STRUCTURE:**

Tree-Definitions and Concepts, Representation of binary tree, Binary tree traversal (In order, post order, preorder), Threaded binary tree, Binary search trees, Applications of Trees-Some balanced tree mechanism, e.g., AVL trees, 2-3 trees, Height Balanced, Weight Balance, Graph-MatrixRepresentation of Graphs, Elementary Graph operations, (Breadth First Search, Depth First Search, Spanning Trees, Shortest path, Minimal spanning tree)

### **UNIT-IV**

**[12 Hours]**

#### **HASHING AND FILE STRUCTURES:**

Hashing: The symbol table, Hashing Functions, Collision-Resolution Techniques, File Structure: Concepts of fields, records and files, Sequential, Indexed and Relative/Random File Organization, Indexing structure for index files, hashing for direct files, Multi-Key file organization and access methods

#### **Course Outcomes:**

At the end of this subject, students should be able to:

1. Explain the significance of arrays, stacks, queues, linked lists, trees, heaps, graphs and Hash Tables are represented in the main memory and manipulated or used by different operations
2. Construct algorithms for performing operations on a datastructure, with an understanding of the trade-off between the time and space complexity.
3. Compare alternate implementations of an Abstract Data Type with respect to their performance.
4. Illustrate various concepts like arrays, stacks, queues, linked lists, trees, heaps, Graphs and Hash Tables are used in various applications.
5. Analyze the computational efficiency of key searching, sorting and hashing algorithms
6. Choose appropriate data structures to solve realworld problems efficiently.

**Text Books:**

1. An Introduction to Data Structures with Applications. by Jean-Paul Tremblay & Paul G. Sorenson Publisher-Tata McGraw Hill.

**Reference Books:**

1. Data Structures using C & C++ -By Ten Baum Publisher Prentice-Hall International.
2. Fundamentals of Data Structures in C++-By Sartaj Sahani.
3. Classical Data Structure by D. Samantha. Pearson publication

**Web Resources:**

1. <https://nptel.ac.in/courses/106102064/>
2. <https://www.edx.org/course/algorithms-and-data-structures-3>

**LIST OF EXPERIMENTS**

| <b>Experi<br/>ment.<br/>No.</b> | <b>Title</b>                                                                                                | <b>Learning<br/>Outcomes</b>    |
|---------------------------------|-------------------------------------------------------------------------------------------------------------|---------------------------------|
| 1.1                             | Write a program to implement following searching algorithms.<br>(1)Linear (2) Binary                        | To understand Searching Concept |
| 1.2                             | Write a program to implement following sorting algorithms.(1)Bubble (2) Selection (3) Quick (4) Merge       | To understand Sorting Concept   |
| 1.3                             | Write a program to implement following STACK operations.<br>(1)PUSH (2) POP (3) PEEP (4) CHANGE (5) DISPLAY | To understand Searching Concept |
| 1.4                             | Write a program to convert infix expression to postfix expression                                           | Application of stack            |
| 1.5                             | Write a program to implement following QUEUE operations.(1)INSERT (2) DELETE (3) DISPLAY                    | To understand Queue Concept     |

|           |                                                                                                                                                                                                                                                                                                 |                                           |
|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|
| 1.6       | Write a program to implement following CQUEUE operations.<br>(1)INSERT (2) DELETE (3) DISPLAY                                                                                                                                                                                                   | Application of Queue concept              |
| 1.7       | Write a program to implement following operations of the singly linked list (SLL).<br><br>(1) Insert a node at the front of the linked list.<br>(2) Insert a node at the end of the linked list.<br>(3) Insert a node such that linked list is in ascending order.<br>(According to Info field) | Linked list concept                       |
| <b>2.</b> | <b>Practical 2</b>                                                                                                                                                                                                                                                                              |                                           |
| 2.1       | Write a program to implement following operations of the singly linked list (SLL).<br><br>(1) Delete a first node of the linked list.<br>(2) Delete a node before specified position.<br>(3) Delete a node after specified position.                                                            | Linked list Implementation                |
| 2.2       | Write a program to implement following operations of the doubly linked list (DLL).<br><br>(1) Insert a node at the front of the linked list.<br>(2) Insert a node at the end of the linked list.                                                                                                | Linked list Implementation                |
| 2.3.      | Write a program to implement following operations of the doubly linked list (DLL).<br><br>(1) Delete a last node of the linked list.<br>(2) Delete a node before specified position                                                                                                             | Linked list Implementation                |
| 2.4       | Write a program to implement stack using linked list.                                                                                                                                                                                                                                           | Implementation of stack using Linked list |
| 2.5       | Write a program to implement queue using linked list.                                                                                                                                                                                                                                           | Implementation of Queue using Linked list |
| 2.6       | Write a program to implement binary tree traversals                                                                                                                                                                                                                                             | Understanding of Tree Data structure      |

**Subject: Operating System**

**Program: CE/CSE/IT**

**Subject Code: CE0418**

**Semester: IV**

| Teaching Scheme (Hours per week) |          |           |         | Examination Evaluation Scheme (Marks) |                                  |                                              |                                                 |       |
|----------------------------------|----------|-----------|---------|---------------------------------------|----------------------------------|----------------------------------------------|-------------------------------------------------|-------|
| Lecture                          | Tutorial | Practical | Credits | University Theory Examination         | University Practical Examination | Continuous Internal Evaluation (CIE)- Theory | Continuous Internal Evaluation (CIE)- Practical | Total |
| 3                                | 0        | 2         | 4       | 40                                    | 40                               | 60                                           | 60                                              | 200   |

### Course Objectives:

1. To understand the services provided by and the design of an operating system.
2. To understand the structure and organization of the file system.
3. To understand what a process is and how processes are synchronized and scheduled.
4. To understand different approaches to memory management.
5. Students should be able to use system calls for managing processes, memory and the file system.
6. Students should understand the data structures and algorithms used to implement an Operating System.

## CONTENTS

### UNIT-I

[12 hours]

#### **Introduction to Operating System**

Architecture of OS (Ex. Monolithic, Microkernel, Layered, Exo kernel), Operating system objectives and functions, Virtual Computers, Interaction of O. S. & hardware architecture, Evolution of operating systems, Batch, multiprogramming. Multitasking, Multiuser, parallel, distributed & real-time O.S., System calls, O. S. Shell, Linux Shell commands, Shell programming. Examples of O. S.: Linux, MS-Windows, Handheld OS.

#### **Process Management**

Process, Process description, Process states, Process control, Threads, Processes and Threads, Uniprocessor Scheduling: Types of scheduling, Scheduling algorithms: FCFS, SJF, Priority, Round Robin, UNIX Multi-level feedback queue scheduling, Thread Scheduling, Multiprocessor Scheduling concept, Real Time Scheduling concept



## **UNIT-II**

[12 hours]

### **Concurrency**

Principles of Concurrency, Critical Section problem, Mutual Exclusion H/W Support, software approaches, Semaphores and Mutex, Message Passing, Monitors, Classical Problems of Synchronization: Readers-Writers Problem, Producer Consumer Problem, Dining Philosopher problem

### **Deadlock:**

System model, Deadlock characterization, Methods for handling deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock detection, Recovery from deadlock.

## **UNIT-III**

[12 hours]

### **Memory Management**

Memory Management requirements, Memory partitioning: Fixed ,dynamic, partitioning, Contiguous memory allocation, Buddy System Memory allocation Strategies (First Fit, Best Fit, Worst Fit, Next Fit), Fragmentation, Swapping, Segmentation , Paging, Virtual Memory, Demand paging, Page Replacement Policies (FIFO, LRU, Optimal, clock) ,Thrashing.

### **I/O Management and Disk Scheduling**

I/O Devices, Organization of I/O functions, Operating System Design issues, I/O Buffering, Disk Scheduling (FCFS, SCAN, C-SCAN, SSTF), Disk Caches.

## **UNIT-IV**

[12 hours]

### **File Management**

Overview, File Organization and access, File Directories, File Sharing, Security issues, Record Blocking, Secondary Storage Management.

### **Computer security & protection:**

Security Threats, Attacks and assets, Intruders, Malicious software, Protection: Protection Policy and mechanisms, Authentications: Internal Access Authorizations, Implementations.

## **Course Outcomes:**

At the end of this subject, students should be able to:

CO 1: Describe the general architecture of computers. [BT-2]

CO 2: Describe, contrast and compare differing structures for operating systems. [BT-4]

CO3: Understand and analyze theory and implementation of processes, resource control (concurrency etc.), physical and virtual memory, scheduling, I/O and files. [BT-2,4]

CO 4: Run Linux commands. [BT-6]

CO 5: Understand background control command. [BT-2]

CO 6: Understand process scheduling in program. [BT-3]

## **Text Books:**

1. Silberschatz, Galvin, and Gagne, "Operating System Concepts", By, Wiley India Pvt Ltd.
2. William Stallings, "Operating Systems Internals and Design Principles", By, Pearson Education.

## **Reference Books:**

1. Andrew S. Tanenbaum, "Modern Operating Systems", By, Pearson Education.
2. Gary Nutt, "Operating Systems", By, Pearson Education.
3. Harvey M. Deital, "Operating Systems", By, Pearson Education.
4. Das Sumitabha, "Unix Concepts and Applications", Tata McGraw Hill.

## **Web Resources:**

1. <https://whatis.techtarget.com/definition/operating-system-OS>
2. [https://www.tutorialspoint.com/operating\\_system/os\\_overview.htm](https://www.tutorialspoint.com/operating_system/os_overview.htm)
3. <https://www.geeksforgeeks.org/introduction-of-operating-system-set-1/>

## **LIST OF EXPERIMENTS**

| <b>Experi<br/>ment.<br/>No.</b> | <b>Basic Commands of Unix commands</b>                       | <b>Learning<br/>Outcomes</b> |
|---------------------------------|--------------------------------------------------------------|------------------------------|
| <b>1.1</b>                      | Explain UNIX Architecture.<br>What are the features of UNIX? | Knowledge of Unix<br>basics  |

|      |                                                                                                                                                                                      |                                               |
|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|
| 1.2  | \$who \$who am i \$mkdir \$cd \$rmdir \$touch \$cat \$cp \$rm<br>\$pwd \$mv \$ls \$lc \$lf \$chmod \$expr \$factor \$units<br>\$bc \$logname \$id \$uname \$tty                      | Knowledge of basic Commands                   |
| 1.3  | \$date \$cmchk \$dfspace \$df \$du \$ulimit \$passwd<br>\$banner \$cal \$file \$wc \$sort \$grep \$cut<br>\$dd \$head \$pg \$lp \$more \$lpstat \$cancel lp                          | Knowledge of basic Commands                   |
| 1.4  | \$compress \$man \$uncompress \$ps \$nohup<br>\$kill \$time \$nice \$at \$mail \$batch                                                                                               | Knowledge of basic Commands                   |
| 2.   | <b>Loops and Conditional statements in Shell programming</b>                                                                                                                         | Knowledge of Loops and Conditional statements |
| 2.1  | Write a shell script to input two no's from the user and perform addition, subtraction, multiplication, and division.                                                                | Knowledge of Loops and Conditional statements |
| 2.2  | The distance between two cities (in km.) is input through the keyboard. Write a shell script to convert and print distance in meters, feet, inches and centimetres.                  | Knowledge of Loops and Conditional statements |
| 2.3. | Any integer is input through the keyboard. Write a shell script to find out whether it is an odd number or even number.                                                              | Knowledge of Loops and Conditional statements |
| 2.4  | Write a shell script which receives any year form the keyboard and determines whether the year is a leap year or not. If no argument is supplied the current year should be assumed. | Knowledge of Loops and Conditional statements |
| 2.5  | Write a shell script to find the factorial of any no entered through keyboard.                                                                                                       | Knowledge of Loops and Conditional statements |
| 3.   | <b>Loops and Conditional statements in Shell programming</b>                                                                                                                         |                                               |

|            |                                                                                                                                                                                                                                                                                                            |                                               |
|------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|
| <b>3.1</b> | Write a shell script which will accept a number and display first n prime numbers as output.                                                                                                                                                                                                               | Knowledge of Loops and Conditional statements |
| <b>3.2</b> | Write a shell script which will generate first nFibonacci numbers like: 1, 1, 2, 3, 5, 13,...                                                                                                                                                                                                              | Knowledge of Loops and Conditional statements |
| <b>3.3</b> | Write a shell script to read n numbers as command arguments and sort them in descending order.                                                                                                                                                                                                             | Knowledge of Loops and Conditional statements |
| <b>3.4</b> | Write a shell script to display all executable files, directories and zero sized files.                                                                                                                                                                                                                    | Knowledge of Loops and Conditional statements |
| <b>3.5</b> | Write a shell script to fetch data from a file and display data into another file in reverse order.                                                                                                                                                                                                        | Knowledge of Loops and Conditional statements |
| <b>3.6</b> | Display calendar of current month Display today's date and time Display usernames those are currently logged in the system Display your name at given x, y position.                                                                                                                                       | Knowledge of Loops and Conditional statements |
| <b>3.7</b> | Write a shell script to print the series 1, 3, 5, 7, 9, ....., N.<br><br>Write a program to print all prime no's from 1 to 300. (Hint – Use Nested Loops, break and continue)<br><br>Write a shell script which deletes all lines containing the word unix in the files as arguments to this shell script. | Knowledge of Loops and Conditional statements |
| <b>4</b>   | <b>ARRAY in Shell programming</b>                                                                                                                                                                                                                                                                          |                                               |

|     |                                                                                                                                                                                                                         |                                          |
|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|
| 4.1 | Given the number N which represents the number of rows and columns, print the different following patterns.                                                                                                             | Knowledge of Array in Shell programming  |
| 4.2 | <pre> 1 1 2 1 2 3 1 2 3 4 1 2 3 4 5 </pre>                                                                                                                                                                              | Knowledge of Array in Shell programming  |
| 4.3 | <pre> # ### ##### ##### ##### ##### ##### ##### ##### ##### </pre>                                                                                                                                                      | Knowledge of Array in Shell programming  |
| 4.4 | <pre> 1 2 2 3 3 3 4 4 4 4 5 5 5 5 5 </pre>                                                                                                                                                                              | Knowledge of Array in Shell programming  |
| 5.  | <b>String in Shell programming</b>                                                                                                                                                                                      |                                          |
| 5.1 | <p>Write a menu driven shell script to perform the following string operations.</p> <p>Compare Two Strings Join Two Strings Find The Length of a Given String Occurrence of Character and Words Reverse the string.</p> | Knowledge of String in Shell programming |

|            |                                                                                                                                                                                                                                                      |                                          |
|------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|
| <b>5.2</b> | Write a shell script to validate the entered date. (eg. Date format is : dd-mm-yyyy) Write an awk program using function, which convert each word in a given text into capital. Write a program for process creation using C. (Use of gcc compiler). | Knowledge of String in Shell programming |
| <b>5.3</b> | Write a shell script to check entered string is palindrome or not.. Shell programming using filters (including grep, egrep, fgrep) Study of Unix Shell and Environment Variables.                                                                    | Knowledge of String in Shell programming |
| <b>6.</b>  | <b>File in Shell programming</b>                                                                                                                                                                                                                     |                                          |
| <b>6.1</b> | Write a shell script which receives two file names as arguments. It should check whether the two file's contents are same or not. If same then the second file should be deleted                                                                     | Knowledge of File in Shell programming   |

**Subject: Management for Engineers**

**Program: B. Tech CE/CSE/IT**

**Subject Code: BB0311**

**Semester: IV**

| Teaching Scheme (Hours per week) |          |           |         | Examination Evaluation Scheme (Marks) |                                  |                                              |                                                 |       |
|----------------------------------|----------|-----------|---------|---------------------------------------|----------------------------------|----------------------------------------------|-------------------------------------------------|-------|
| Lecture                          | Tutorial | Practical | Credits | University Theory Examination         | University Practical Examination | Continuous Internal Evaluation (CIE)- Theory | Continuous Internal Evaluation (CIE)- Practical | Total |
| 2                                | 0        | 0         | 2       | 40                                    | 0                                | 60                                           | 0                                               | 100   |

**Course Objectives:**

1. Techniques relating to managing engineering activities, engineer's transition into management, engineering managerial functions, motivation of individual and group behavior.
2. Productivity assessment/improvement.
3. Managing the quality function and communications.

**CONTENTS**

**UNIT-I**

**[7 hours]**

Meaning, importance, skills and roles of manager, different levels of management. Functions of management, planning: nature, importance, steps, Organizing: Meaning, process, principles of organizing, staffing:-manpower planning, recruitment, selection, placement.

**UNIT-II**

**[7 hours]**

Leadership and Organizations Management, Strategic Planning, Budgeting, Project Planning - Risk Identification, Assessment and Response Planning

**UNIT-III**

**[7 hours]**

Management of Technology, Product Development and Innovation, Technical Entrepreneurship, Global Trade and International Operations, Operations Management

## **UNIT-IV**

**[7 hours]**

Marketing Management:-the 4 p's of marketing, demand forecasting (concepts only), market segmentation. Financial management:-meaning, scope, functions, objectives, role of financial manager. Lean Systems, Intellectual Property, Legal Issues in Engineering Management, Principles of Ethics for Engineering Managers

### **Course Outcomes:**

1. Able to know, comprehend, apply, analyze, synthesize and evaluate the basic principles of the fundamentals of managing technical organizations.
2. Prepare for further study in the area of engineering technology management.
3. Able to identify and apply appropriate management techniques for managing contemporary organizations.
4. Have an understanding of the skills, abilities, and tools needed to obtain a job on a management track in an organization of their choice.


### **Text Books:**

1. Principles of Management by PC Tripathi & Reddy.
2. Management –I by Stephen P. Robbins& Stoner.
3. Management-II BY Kotler,Stoner

### **Reference Books:**

1. L. M. Prasad; Principles of Management; Sultan Chand and Sons
2. Karminder Ghuman and K. Aswathapa; Management – Concept



|  ज्ञानेन प्रकाशते जगत्<br><b>INDUS UNIVERSITY</b> |          |           |         | <b>INDUS INSTITUTE OF TECHNOLOGY &amp; ENGINEERING</b><br>Constituent Institute of Indus University |                                  |                                              |                                                 |       |
|------------------------------------------------------------------------------------------------------------------------------------|----------|-----------|---------|-----------------------------------------------------------------------------------------------------|----------------------------------|----------------------------------------------|-------------------------------------------------|-------|
| <b>Subject: Core Java Programming</b>                                                                                              |          |           |         |                                                                                                     |                                  |                                              |                                                 |       |
| <b>Program: B. Tech CE/CS/IT</b>                                                                                                   |          |           |         | <b>Subject Code: CE0421</b>                                                                         |                                  |                                              | <b>Semester: IV</b>                             |       |
| <b>Teaching Scheme (Hours per week)</b>                                                                                            |          |           |         | <b>Examination Evaluation Scheme (Marks)</b>                                                        |                                  |                                              |                                                 |       |
| Lecture                                                                                                                            | Tutorial | Practical | Credits | University Theory Examination                                                                       | University Practical Examination | Continuous Internal Evaluation (CIE)- Theory | Continuous Internal Evaluation (CIE)- Practical | Total |
| 3                                                                                                                                  | 0        | 2         | 4       | 40                                                                                                  | 40                               | 60                                           | 60                                              | 200   |

### Course Objectives:

1. To understand object oriented programming concepts and implement in java.
2. Comprehend building blocks of OOPs language, inheritance, package and interfaces.
3. Identify exception handling methods.
4. Implement multithreading in object oriented programs.
5. Prepare UML diagrams for software system
6. To enhance the programming skills of students into field of Java Programming and to create their interest in the same field.

### CONTENTS

#### UNIT-I

[12 Hours]

#### **Basics of Java:**

Features of Java, Byte Code and Java Virtual Machine, JDK, Data types, Operator, Control Statements – If , else, nested if, if-else ladders, Switch, while, do-while, for, for-each, break, continue.

**Array and String:** Single and Multidimensional Array, String class, StringBuffer class, Operations on string, Command line argument, Use of Wrapper Class.

**Classes, Objects and Methods:** Class, Object, Object reference, Constructor, Constructor Overloading, Method Overloading, Recursion, Passing and Returning object form Method, new operator, this and static keyword, finalize() method, Access control, modifiers, Nested class, Inner class, Anonymous inner class, Abstract class.

## **UNIT-II**

**[12 Hours]**

### **Inheritance and Interfaces:**

Use of Inheritance, Inheriting Data members and Methods, constructor in inheritance, Multilevel Inheritance – method overriding Handle multilevel constructors – super keyword, Stop Inheritance - Final keywords, Creation and Implementation of an interface, Interface reference, instanceof operator, Interface inheritance, Dynamic method dispatch ,Understanding of Java Object Class, Comparison between Abstract Class and interface, Understanding of System.out.println –statement **Package:** Use of Package, CLASSPATH, Import statement, Static import, Access control.

**Exception Handling:** Exception and Error, Use of try, catch, throw, throws and finally, Built in Exception, Custom exception, Throwable Class.

## **UNIT-III**

**[12 Hours]**

### **Networking with java.net:**

InetAddress class, Socket class, DatagramSocket class, DatagramPacket class.

**IO Programming:** Introduction to Stream, Byte Stream, Character stream, Readers and Writers, File Class, File InputStream, File Output Stream, InputStreamReader, OutputStreamWriter, FileReader, FileWriter, Buffered Reader.

**Collection Classes:** List, AbstractList, ArrayList, LinkedList, Enumeration, Vector, Properties, Introduction to Java.util package.

## **UNIT-IV**

**[12 Hours]**

### **Multithreaded Programming:**

Use of Multithread programming, Thread class and Runnable interface, Thread priority, Thread synchronization, Thread communication, Deadlock.

**Generics:** Generics Fundamentals, Bounded Types, Using wildcard arguments & bounded wildcards, Generic methods, constructors, class hierarchies & Interfaces.

**Applets:** Applet basics, complete skeleton, initialization & termination, repainting, Using status window & passing parameters to applets.

### **Course Outcome:**

After successful completion of the course, student will able to:

1. Apply the object oriented concepts for the given problem and able to do work in OOP Concept technology.
2. Use and create packages in a java program and manage project web classes in

proper order.

3. Create applet application as per customer requirement and develop skill in desktop application development.
4. Use exceptions, threads, collections, logs of Java for the given problem. So they can able design user friendly application.
5. Use graphical user interface using applet in Java programs and able to work in GUI design requirement in industry.
6. Understand and know about basic knowledge of different java framework and able to select future way of interested framework.

### **Text Books:**

- 1) Java Fundamentals, A comprehensive introduction by Herbert Schildt, Dale Skrien, McGraw Hill Education, First Edition, 2013, ISBN 13:978125900659

### **Reference Books:**

- 1) Programming with Java A Primer – E.Balaguruswamy, McGrawhill, 4th Edition, 2009,ISBN - 9780070141698
- 2) The Complete Reference, Java 2 Herbert Schildt, TMH, 7th Edition, 2007, ISBN: 978-0-07- 163177-8
- 3) Core Java Volume-I Fundamentals Horstmann & Cornell, - Pearson Education, 8th Edition, 2008, ISBN -9780132354769
- 4) Object Oriented Modeling and Design with UML Michael Blaha and James Rumbaugh – Pearson Publication, 2nd Edition, 2005, ISBN -9780131968592
- 5) UML Distilled: A Brief Guide to the Standard Object Modeling Language by Martin Fowle, 3rd Edition, 2004, ISBN -0321193687

### **Web Resources:**

1. OOP, Basic of Java:  
[http://www.nptelvideos.com/java/java\\_video\\_lectures\\_tutorials.php](http://www.nptelvideos.com/java/java_video_lectures_tutorials.php)
2. Exceptions and Functions:  
[http://www.nptelvideos.com/java/java\\_video\\_lectures\\_tutorials.php?pn=1](http://www.nptelvideos.com/java/java_video_lectures_tutorials.php?pn=1)
3. Multithreading:  
<http://www.learnerstv.com/Free-Computers-Video-lectures-ltv006-Page1.htm>
4. Networking Basics:  
<http://nptel.ac.in/courses/106105084/>

### LIST OF EXPERIMENTS

| <b>Experiment . No.</b> | <b>Title</b>                                                                                                              | <b>Learning Outcomes</b>          |
|-------------------------|---------------------------------------------------------------------------------------------------------------------------|-----------------------------------|
| 1                       | Steps to compile and run JAVA program, program to print "Hello" on the console (Command Prompt). object oriented concepts | Basic concept of JAVA programming |
| 2                       | User input as command line argument                                                                                       | Concept of command line           |
| 3                       | Programs on Objects and classes                                                                                           | Concept of object and class       |
| 4                       | String operations using Java, difference between String and String Buffer                                                 | Concept of string                 |
| 5                       | Constructor overloading and variable overriding                                                                           | Concept of overloading            |
| 6                       | Static keyword in java, Access Modifiers in Java                                                                          | Concept of access specifier       |
| 7                       | Programs on Inheritance                                                                                                   | Inheritance                       |
| 8                       | Programs on Interface                                                                                                     | Interface                         |
| 9                       | Package based application and need of package                                                                             | Package                           |
| 10                      | Exception Handling and Exception generation in Java                                                                       | Exception handling                |
| 11                      | Programs on Multithreading                                                                                                | Threading                         |
| 12                      | Buffered Reader, Buffered Writer, Random Access File, Object I/O, Applications of File I/O                                | Concept of I/O                    |
| 13                      | Programs on Collection classes                                                                                            | Collection class                  |
| 14                      | Generics                                                                                                                  | Generics                          |
| 15                      | Applet Life Cycle, Graphics and Shapes in Applet using java.awt.* package classes                                         | Applet                            |

**Computer Engineering Department, Indus Institute of Engineering & Technology, Indus University**

**Program - B. Tech (Computer Engineering)**

**SEMESTER - V**

| Sr. No. |        | Name of the subject                     | Credit | Teaching Scheme |      |     |           | Evaluation Scheme |     |           |     |       | Segment |
|---------|--------|-----------------------------------------|--------|-----------------|------|-----|-----------|-------------------|-----|-----------|-----|-------|---------|
|         |        |                                         |        | (per week)      |      |     |           | Theory            |     | Practical |     | Total |         |
|         |        |                                         |        |                 |      |     |           | CIE               | ESE | CIE       | ESE | Marks |         |
|         |        |                                         |        | Th.             | Tut. | Pr. | Tot (hr.) | Th.               | Th. | Pr.       | Pr. |       |         |
| 1       | CE0516 | Design and Analysis of Algorithms       | 4      | 3               | 0    | 2   | 5         | 60                | 40  | 60        | 40  | 200   | Core    |
| 2       | CE0517 | Microprocessing and Interfacing         | 4      | 3               | 0    | 2   | 5         | 60                | 40  | 60        | 40  | 200   | ES      |
| 3       | CE0518 | Computer Networks                       | 4      | 3               | 0    | 2   | 5         | 60                | 40  | 60        | 40  | 200   | Core    |
| 4       |        | <i>Open Elective 6</i>                  | 3      | 3               | 0    | 0   | 3         | 60                | 40  | 0         | 0   | 100   | OE      |
| 5       | CE0525 | Programming for Scientific Computing    | 4      | 3               | 0    | 2   | 5         | 60                | 40  | 60        | 40  | 200   | Core    |
| 6       | CE0522 | Web Technology                          | 4      | 3               | 0    | 2   | 5         | 60                | 40  | 60        | 40  | 200   | Core    |
| 7       | CE0523 | Internship Credit /Online courses/ MOOC | 2      | 0               | 0    | 0   | 0         | 0                 | 0   | 100       | 0   | 100   | IC      |
|         |        | Total                                   | 25     | 18              | 0    | 10  | 28        | 360               | 240 | 400       | 200 | 1200  |         |

**Subject: Design and Analysis of Algorithms**

**Program: B. Tech CE/CS/IT**

**Subject Code: CE0516**

**Semester: V**

| Teaching Scheme (Hours per week) |          |           |         | Examination Evaluation Scheme (Marks) |                                  |                                              |                                                 |       |
|----------------------------------|----------|-----------|---------|---------------------------------------|----------------------------------|----------------------------------------------|-------------------------------------------------|-------|
| Lecture                          | Tutorial | Practical | Credits | University Theory Examination         | University Practical Examination | Continuous Internal Evaluation (CIE)- Theory | Continuous Internal Evaluation (CIE)- Practical | Total |
| 3                                | -        | 2         | 4       | 40                                    | 40                               | 60                                           | 60                                              | 200   |

### Course Objectives:

1. To be able to analyze algorithms by working out complexity of algorithms.
2. To understand alternate methods of writing algorithms under various categories, such as Divide-and-Conquer, Dynamic Programming, Greedy Methods, Backtracking, Branch & Bound, etc.
3. To understand the basics of P, NP, and NP Complete problems
4. To develop skills in problem solving and programming.

## CONTENTS

### UNIT-I

[12 hours]

#### **Basics of Algorithms and Mathematics:**

What is an algorithm? Mathematics for Algorithmic Sets, Functions and Relations, Vectors and Matrices, Linear Inequalities and Linear Equations.

#### **Analysis of Algorithm:**

The efficient algorithm, Best, Average and Worst case analysis, Elementary operation, Asymptotic Notation, Analyzing control statement, Amortized analysis, Sorting Algorithm, Binary Tree Search.

## UNIT-II

[12 hours]

### **Divide and Conquer Algorithm:**

Introduction, Multiplying large Integers Problem, Problem Solving using divide and conquer algorithm - Binary Search, Sorting (Merge Sort, Quick Sort), Matrix Multiplication, Exponential.

### **Greedy Algorithm:**

General Characteristics of greedy algorithms, Problem solving using Greedy Algorithm - Activity selection problem, Elements of Greedy Strategy, Minimum Spanning trees (Kruskal's algorithm, Prim's algorithm), Graphs: Shortest paths, The Knapsack Problem, Job Scheduling Problem.

## UNIT-III

[12 hours]

### **Dynamic Programming:**

Introduction, The Principle of Optimality, Problem Solving using Dynamic Programming – Calculating the Binomial Coefficient, Making Change Problem, Assembly Line-Scheduling, Knapsack problem, Shortest path, Matrix chain multiplication, Longest Common Subsequence.

### **Exploring Graphs:**

An introduction using graphs and games, Undirected Graph, Directed Graph, Depth First Search, Breath First Search, Backtracking and Branch & Bound– The Knapsack Problem, The Eight Queens problem.

## UNIT-IV

[12 hours]

### **String Matching:**

Introduction, The naive string matching algorithm, The Rabin-Karp algorithm, String Matching with finite automata.

### **Introduction to NP-Completeness:**

The class P and NP, Polynomial reduction, NP- Completeness Problem, NP-Hard Problems.

### Course Outcomes

At the end of this course, students should be able to:

1. Analyze the asymptotic performance of algorithms.
2. Derive and solve recurrences describing the performance of divide-and-conquer algorithms.

3. Find optimal solution by applying various methods.
4. Apply pattern matching algorithms to find particular pattern.
5. Differentiate polynomial and non polynomial problems.
6. Explain the major graph algorithms and their analyses. Employ graphs to model engineering problems, when appropriate.

**Text Books:**

1. Introduction to Algorithms, Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein, PHI., Third edition, 2009, ISBN-13: 9780262033848
2. Fundamental of Algorithms by Gills Brassard, Paul Bratley. First Edition, 1995, ISBN-13: 978-0133350685

**Reference Books:**

1. Introduction to Design and Analysis of Algorithms, Anany Levitin, Pearson publication, 2<sup>nd</sup> Edition, 2009, ISBN - 9788131718377

**Web Resources:**


1. [https://onlinecourses.nptel.ac.in/noc17\\_cs20/preview](https://onlinecourses.nptel.ac.in/noc17_cs20/preview)
2. <http://freevideolectures.com/Course/2281/Design-and-Analysis-of-Algorithms/6>
3. <http://www.nptelvideos.in/2012/11/design-analysis-of-algorithms.html>
4. <http://www.nptelvideos.com/video.php?id=1444>

**LIST OF EXPERIMENTS**

| <b>Experiment No.</b> | <b>Title</b>                                                                                       | <b>Learning Outcomes</b>                        |
|-----------------------|----------------------------------------------------------------------------------------------------|-------------------------------------------------|
| 1                     | Implementation and Time analysis of linear and binary search algorithm.                            | Efficient searching method                      |
| 2                     | Implementation and Time analysis of sorting algorithms : Bubble sort, Selection sort and Quicksort | Efficient Sorting Method                        |
| 3                     | Implementation and Time analysis of factorial program using iterative and recursive method.        | Time Analysis of iterative and recursive method |
| 4                     | Implement Prim's algorithm                                                                         | Greedy Approach                                 |
| 5                     | Implement Kruskal's algorithm.                                                                     | Greedy Approach                                 |
| 6                     | Implementation of a knapsack problem using dynamic programming.                                    | Dynamic Programming                             |



|    |                                                                          |                     |
|----|--------------------------------------------------------------------------|---------------------|
| 7  | Implementation of matrix chain multiplication using dynamic programming. | Dynamic Programming |
| 8  | Implementation of making a change problem using dynamic programming      | Dynamic Programming |
| 9  | Implementation of Graph and Searching (DFS and BFS).                     | Graph Traversal     |
| 10 | Implement LCS problem.                                                   | Dynamic programming |

|                                                                                                                                    |                 |                  |                |                                                                                                     |                                         |                                                     |                                                        |              |
|------------------------------------------------------------------------------------------------------------------------------------|-----------------|------------------|----------------|-----------------------------------------------------------------------------------------------------|-----------------------------------------|-----------------------------------------------------|--------------------------------------------------------|--------------|
|  <b>INDUS UNIVERSITY</b><br>ज्ञानेन प्रकाशते जगत् |                 |                  |                | <b>INDUS INSTITUTE OF TECHNOLOGY &amp; ENGINEERING</b><br>Constituent Institute of Indus University |                                         |                                                     |                                                        |              |
| <b>Subject: Microprocessing &amp; Interfacing</b>                                                                                  |                 |                  |                |                                                                                                     |                                         |                                                     |                                                        |              |
| <b>Program: B. Tech CE</b>                                                                                                         |                 |                  |                | <b>Subject Code: CE0517</b>                                                                         |                                         |                                                     | <b>Semester: V</b>                                     |              |
| <b>Teaching Scheme (Hours per week)</b>                                                                                            |                 |                  |                | <b>Examination Evaluation Scheme (Marks)</b>                                                        |                                         |                                                     |                                                        |              |
| <b>Lecture</b>                                                                                                                     | <b>Tutorial</b> | <b>Practical</b> | <b>Credits</b> | <b>University Theory Examination</b>                                                                | <b>University Practical Examination</b> | <b>Continuous Internal Evaluation (CIE)- Theory</b> | <b>Continuous Internal Evaluation (CIE)- Practical</b> | <b>Total</b> |
| <b>3</b>                                                                                                                           | <b>0</b>        | <b>2</b>         | <b>4</b>       | <b>40</b>                                                                                           | <b>40</b>                               | <b>60</b>                                           | <b>60</b>                                              | <b>200</b>   |

### Course Objectives

1. Student will be able to describe the architecture of 8086 microprocessor.
2. Student will be able to understand interfacing of Memory chip with 8086 microprocessors.
3. Student will be able to understand interfacing of I/O devices with 8086 microprocessors.
4. To introduce MASM assembler for programming of Intel microprocessor.
5. Students will be able to understand the multiprocessing and multiprogramming environment
6. Student will be able to understand the use of various peripheral IC's such as 8255,8254,8237,8259.

## CONTENTS

### UNIT-I

**[10 hours]**

#### **Introduction to 8086 Microprocessor**

Introduction to 8086 Microprocessor, Bus Interface Unit (BIU), Execution Unit Pin Configuration of 8086, Pin Details of 8086, Memory Organization of 8086

#### **8086 Based System**

8086 Minimum Mode Configuration, Demultiplexing of the Multiplexed Buses, Transceiver 8286, Generation of Control Signals, Clock Generator 8284 and Driver, Interfacing of Memory in Minimum Mode, Maximum Mode Configuration of 8086 , Bus Controller 8288 ,Memory Interface of a Maximum-Mode 8086 System , Bus Cycles of 8086 , Minimum Mode Bus Cycles, Maximum mode bus cycles

## UNIT-II

[10 hours]

### **Instruction set of 8086**

Introduction, Addressing Modes of 8086, Data Addressing Modes, Address Addressing Modes, Instruction Format, Instruction Set of 8086, Data Transfer Instructions, Arithmetic Instructions, Logical Instructions, Shift and Rotate Instructions, String Instructions, Adjustment Instructions, Flag Related Instructions, Control Transfer Instructions, Processor-control Instructions

### **Assembler Directives**

Introduction, Assembly Language, Assembly Language Program Development Tools, Editor, Assembler, Linker, Loader, Debugger, TASM Assembler, MASM Assembler, Assembler Directives, Data Defining Assembler Directives, Segment Defining Directives, Combining Segments, Managing Large Programs, Processor Directives, Initialization of Program Memory Models , Assembly language

## UNIT-III

[10 hours]

### **Interrupts of 8086**

Introduction, Advantages of Interrupts, Interrupt Systems, Single Line or Single Level Interrupt System, Multilevel or Multi Line Interrupt System, Classification of Interrupts, Interrupts of 8086, Interrupt Pointer Table, Dedicated Interrupts of 8086, Software Interrupts of 8086, Priority of Interrupts

### **Memory and I/O Interfacing**

Introduction, I/O Devices and their interfacing, I/O addressing, Interfacing of Input Devices, Interfacing of output devices, Memory Interfacing, Address decoding, Interfacing circuit.

### **Programmable peripheral Interfacing chips**

Introduction, Programmable peripheral Interfacing chip 8255, 8254 Programmable Timer

## UNIT-IV

[10 hours]

### **Programmable peripheral Interfacing chips**

8237 DMA Controller, 8259 Programmable Interrupt Controller, 8279 Display and Keyboard controller.

### **Multiprocessing and Multiprogramming**

Introduction, 8086 based multiprocessing system, coprocessor configuration, closely coupled configuration, loosely coupled configuration, bus allocation schemes.

## **Course Outcomes**

1. Identify detailed S/W and H/W architecture of the microprocessor.
2. Understand and classify the instruction set of the 8086 microprocessor and distinguish the use of different instructions.
3. Students will be able to write assembly language programs for 8086 based systems.
4. Student will be able to build system using 8086 microprocessor and peripherals,
5. Able to develop a multi-tasking system using interrupt.
6. Understand the multiprocessing and multiprogramming environment.

## **Text Books:**

1. Microprocessor 8086 Architecture, Programming and Interfacing- Sunil Mathur, PHI learning private limited.
2. 8086/8088 family: Design Programming and Interfacing: By John Uffenbeck (Pearson Education).
3. The 8088 And 8086 Microprocessors: Programming, Interfacing, Software, Hardware and Applications, Pearson Education India, Walter A Tribel, Avtar Singh

## **Reference Books:**

1. 8086 Microprocessor Programming and Interfacing the PC: By Kenneth Ayala

## **Web Resources:**

1. Microprocessor course on NPTEL:  
<https://nptel.ac.in/courses/108105102/59>

**Subject: Computer Networks**

**Program: B. Tech Computer Engineering**

**Subject Code: CE0518**

**Semester: V**

**Teaching Scheme (Hours per week)**

**Examination Evaluation Scheme (Marks)**

| Lecture | Tutorial | Practical | Credits | University Theory Examination | University Practical Examination | Continuous Internal Evaluation (CIE)- Theory | Continuous Internal Evaluation (CIE)- Practical | Total |
|---------|----------|-----------|---------|-------------------------------|----------------------------------|----------------------------------------------|-------------------------------------------------|-------|
| 3       | 0        | 2         | 4       | 40                            | 40                               | 60                                           | 60                                              | 200   |

### **Course Objectives:**

1. To understand the significance and concepts of the layered model for computer networking.
2. Provides knowledge about computer network related hardware and software using a layered architecture.
3. Identify basic protocols and design issues for layered model.
4. Seeking employment that will allow use of troubleshooting and analysis skills.
5. The emphasis of the course will be developing skills in the concepts and the engineering trade-offs involved in the working of the network protocols.

## **CONTENTS**

### **UNIT-I**

**[12 hours]**

#### **Introduction to Computer Networks:**

Basics of Data Communication System and its components, Computer network and its goals, Types of computer networks: LAN, MAN, WAN, Wireless networks, Transmission media, Network software: concept of layers, protocols, interfaces and services, ISO-OSI reference model, TCP/IP reference model.

#### **Data Link Layer:**

Design issues, Framing, Types of Errors, Error detection and correction codes: checksum, CRC, hamming code, Data link protocols for noisy and noiseless channels, Sliding Window Protocols: Stop & Wait ARQ, Go-back-N ARQ, Selective repeat ARQ. Data link protocols: HDLC and PPP.

## **UNIT-II**

[12 hours]

### **Medium Access Sub-Layer:**

Static and dynamic channel allocation, Random Access: ALOHA, CSMA protocols, Controlled Access: Polling, Token Passing, IEEE 802.3 frame format, Ethernet cabling, Manchester encoding, collision detection in 802.3, Binary exponential back off algorithm.

## **UNIT-III**

[12 hours]

### **Network Layer:**

Design issues, IPv4 classful and classless addressing, subnetting, Protocols: IP, ARP, RARP, ICMP, Routing algorithms: distance vector and link state routing, shortest path algorithm, Routing protocols: IGMP, OSPF, RIP, BGP, flooding, Congestion control: Principles of Congestion Control, Congestion prevention policies, Leaky bucket and token bucket algorithms.

## **UNIT-IV**

[12 hours]

### **Transport Layer:**

Elements of transport protocols, introduction to TCP/UDP protocols and their comparison. The TCP Service Model, The TCP Segment Header, The Connection Establishment, The TCP Connection Release, The TCP Connection Management Modeling, The TCP Sliding Window.

### **Application Layer:**

Hyper Text Transfer Protocol (HTTP), Domain Name System (DNS), File Transfer Protocol (FTP), Dynamic Host Configure Protocol (DHCP)

## **Course Outcomes:**

At the end of this subject, students should be able to:

1. Independently understand basic computer network technology.
2. Understand and explain Data Communications System and its components.
3. Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer.
4. Identify the different types of network devices and their functions within a network
5. Understand and building the skills of subnetting and routing mechanisms.
6. Familiarity with the basic protocols of computer networks, and how they can be used to assist in network design and implementation.

**Text Books:**

1. Data Communications and Networking, Fourth Edition by Behrouza A. Forouzan, TMH.
2. Computer Networks, A.S. Tanenbaum, 4<sup>th</sup> edition, Pearson education.

**Reference Books:**

1. Computer Network, Natalia Olifer, Victor Olifer, Wiley-India edition.
2. Data and computer communication, William Stallings, Pearson
3. Local area Networks by Peter Hudson

**Web Resources:**

1. <https://www.youtube.com/watch?v=UXMIxCYZu8o>
2. <https://youtu.be/pV11L1jrbFE>
3. <https://youtu.be/AmlOSGYkKXc>

**LIST OF EXPERIMENTS**

| <b>Experi<br/>ment.<br/>No.</b> | <b>Title</b>                                                                                                        | <b>Learning Outcomes</b>              |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------|---------------------------------------|
| 1                               | To study different types of topologies.                                                                             | Know the various topologies           |
| 2                               | To study different category of networks.                                                                            | Know different category of networks   |
| 3                               | To compare OSI and TCP/IP protocol model                                                                            | Study OSI and TCP/IP model            |
| 4                               | To demonstrate Networking and Internetworking devices.(NIC, Switch, Hub, Router, Gateway, Repeater, Bridge, Cables) | Learn regarding various devices       |
| 5                               | Write a program which demonstrates the concept of bit stuffing.                                                     | To study the concept of bit stuffing  |
| 6                               | Write a program which demonstrates the concept of byte stuffing.                                                    | To study the concept of byte stuffing |

|    |                                                                                          |                                                    |
|----|------------------------------------------------------------------------------------------|----------------------------------------------------|
| 7  | Write a program which demonstrates the concept of Error Detection Methods like VRC, LRC. | To study the concept of LRC/VRC                    |
| 8  | Configuration of router in packet tracer.                                                | To study the configuration of router               |
| 9  | Simulation of RIP protocol in packet tracer.                                             | To study the configuration of RIP protocol.        |
| 10 | Simulation of OSPF protocol in packet tracer.                                            | To study the configuration of OSPF protocol.       |
| 11 | Simulation of BGP protocol in packet tracer.                                             | To study the configuration of BGP protocol.        |
| 12 | Write a program which demonstrates the concept of Parity Checking.                       | To study the configuration of error configuration. |
| 13 | Study of packet sniffing tools. (Wireshark, tcpdump)                                     | To study concept of wireshark, tcpdump             |
| 14 | To study RS-232 standard.                                                                | To learn RS 232 concepts.                          |
| 15 | Write a program which demonstrates the concept of Error Detection Method CRC.            | To study the configuration of error detection.     |



**Subject: Programming for Scientific Computing (Python)**

**Program: B. Tech CE/CS/IT**

**Subject Code: CE0525**

**Semester: V**

**Teaching Scheme (Hours per week)**

**Examination Evaluation Scheme (Marks)**

| Lecture | Tutorial | Practical | Credits | University Theory Examination | University Practical Examination | Continuous Internal Evaluation (CIE)- Theory | Continuous Internal Evaluation (CIE)- Practical | Total |
|---------|----------|-----------|---------|-------------------------------|----------------------------------|----------------------------------------------|-------------------------------------------------|-------|
| 3       | 0        | 2         | 4       | 40                            | 40                               | 60                                           | 60                                              | 200   |

### Course Objectives:

1. Importance of Python as scientific computing tool which directly leads to employability.
2. To learn how to design and develop Python applications.
3. Skill development to apply mutable and immutable types.
4. To learn how to design object-oriented concepts in python.
5. Development of GUI based applications for entrepreneurship.
6. To learn how to build and package Python modules for reusability.

## CONTENTS

### UNIT-I

[12 hours]

Basic elements of Python, Branching, looping, Strings and Input, Iteration, Functions, Recursion, Global variables, Modules, Files, Structured Objects, Mutability: Strings, Tuples, Lists, Sets, Dictionaries, Functions as Objects, Mutability and Higher-Order Functions.

### UNIT-II

[12 hours]

Object-Oriented Programming, Abstract Data Types and Classes, Encapsulation and Information Hiding, Simple Algorithms and Data structures, Regular Expressions – REs, Networking, Multithreading in Python.

### **UNIT-III**

**[12 hours]**

Array computing and curve plotting, vectors and higher-dimensional arrays, matrices, numPy, sciPy and Matplotlib, Plotting using PyLab, Chat Application, Graphics and GUI Programming – Drawing using Turtle, Tkinter.

### **UNIT-IV**

**[12 hours]**

Python Pandas - Data alignment, aggregation, summarization, computation and analysis with Pandas. Scientific computation using Python - Statistical data analysis, image processing, Basics of web development (Introduction to frameworks flask, Tensorflow).

#### **Course Outcomes:**

At the end of this subject, students should be able to:

1. Work with the Python standard libraries.
2. Implement mutability for various elements of Python.
3. Develop GUI based projects.
4. Design Networking configuration for chatting applications.
5. Implement Scientific Computing.
6. Solve real world problems using Python programming.

#### **Text Books:**

1. John V Guttag. “Introduction to Computation and Programming Using Python”, Prentice Hall of India
2. Hans Petter Langtangen, A Primer on Scientific Programming with Python

#### **Reference Books:**

1. Claus Fuhrer, Jan Erik Solem, Olivier Verdier, Scientific Computing with Python 3, Packt Publishing Limited
2. Martin C. Brown, Python: The Complete Reference, McGraw Hill Education R. Nageswara Rao, “Core Python Programming”, dreamtech
3. Wesley J. Chun. “Core Python Programming - Second Edition”, Prentice Hall
4. Michael T. Goodrich, Roberto Tamassia, Michael H. Goldwasser, “Data Structures and Algorithms in Python”, Wiley

5. Kenneth A. Lambert, “Fundamentals of Python – First Programs”, CENGAGE Publication

**Web Resources:**

- 1) <https://www.edx.org/course/introduction-to-computer-science-and-programming-using-python-2>
- 2) <http://www.openculture.com/2017/05/learn-python-with-a-free-online-course-from-mit.html>
- 3) <https://www.edx.org/course/introduction-to-python-absolute-beginner-3>

**LIST OF EXPERIMENTS**

| Experi<br>ment.<br>No. | Title                                                                                                                                                                            | Learning<br>Outcomes |
|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|
| 1.1                    | Write a Python program to print the calendar of a given month and year.                                                                                                          | CO1                  |
| 1.2                    | Write a Python program to calculate number of days between two dates.                                                                                                            | CO1                  |
| 1.3                    | Write a Python program to check whether a specified value is contained in a group of values.<br><br><i>Test Data :</i><br>3 -> [1, 5, 8, 3] : True<br>-1 -> [1, 5, 8, 3] : False | CO1                  |
| 1.4                    | Write a Python program to get OS name, platform and release information.                                                                                                         | CO1                  |
| 2.                     | <b>Mutable and Immutable types</b>                                                                                                                                               |                      |
| 2.1                    | Write a Python program which accepts a sequence of comma-separated numbers from user and generate a list and a tuple with those numbers.                                         | CO2                  |
| 2.2                    | Write a Python program to display the first and last colors from the following list.[orange, purple, red,yellow,blue]                                                            | CO2                  |

|      |                                                                                                                                                                                                                                                                                                   |     |
|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| 2.3. | Write a Python program to concatenate all elements in a list into a string and return it.                                                                                                                                                                                                         |     |
| 2.4  | Write a Python program to print out a set containing all the colors from color_list_1 which are not present in color_list_2.<br><br><i>Test Data :</i><br>color_list_1 = set(["White", "Black", "Red"])<br>color_list_2 = set(["Red", "Green"])<br><i>Expected Output :</i><br>{'Black', 'White'} | CO2 |
| 2.5  | Write a Python script to print a dictionary where the keys are numbers between 1 and 15 (both included) and the values are square of keys. Sample Dictionary<br>{1: 1, 2: 4, 3: 9, 4: 16, 5: 25, 6: 36, 7: 49, 8: 64, 9: 81, 10: 100, 11: 121, 12: 144, 13: 169, 14: 196, 15: 225}                | CO2 |
| 2.6  | Write a Python program to print all unique values in a dictionary.<br>Sample Data : [{"V": "S001"}, {"V": "S002"}, {"VI": "S001"}, {"VI": "S005"}, {"VII": "S005"}, {"V": "S009"}, {"VIII": "S007"}]<br>Expected Output : Unique Values: {'S005', 'S002', 'S007', 'S001', 'S009'}                 | CO2 |
| 3.   | <b>Data Structures, RE and Plots</b>                                                                                                                                                                                                                                                              |     |
| 3.1  | Develop programs for data structure algorithms using python – searching, sorting and hash tables.                                                                                                                                                                                                 | CO6 |
| 3.2  | Write a Python Program that searches a string to see if it starts with "The" and ends with "Indus".                                                                                                                                                                                               | CO1 |
| 3.3  | Write a Python Program that returns a match where the string contains a white space character.                                                                                                                                                                                                    | CO1 |
| 3.4  | Write a Python program that matches a string that has an a followed by three 'b'.                                                                                                                                                                                                                 | CO1 |
| 3.5  | Develop chat room application using multithreading.                                                                                                                                                                                                                                               | CO4 |
| 3.6  | Perform basic plotting using the randomly generated data to plot graph using series and matplotlib.                                                                                                                                                                                               | CO1 |
| 3.7  | Generate different types of bar plot and Pie plot to understand behavior of given data.                                                                                                                                                                                                           | CO1 |

|           |                                                               |     |
|-----------|---------------------------------------------------------------|-----|
| <b>4</b>  | <b>Tkinter, turtle, flask</b>                                 |     |
| 4.1       | Create (1) Registration form (2) Quiz form using tkinter.     | CO3 |
| 4.2       | Draw (1) Square (2) Rectangle (3) Star patterns using Turtle. | CO3 |
| 4.3       | Basics of Flask.                                              | CO3 |
| 4.4       | Basics of Tensor flow.                                        | CO3 |
| <b>5.</b> | <b>Numpy</b>                                                  |     |
| 5.1       | Practicals based on Numpy statistical analysis.               | CO5 |
| <b>6.</b> | <b>Pandas</b>                                                 |     |
| 6.1       | Practicals based on Pandas                                    | CO1 |

| <b>Subject: Web Technology</b>          |          |           |         |                                              |                                  |                                              |                                                 |       |
|-----------------------------------------|----------|-----------|---------|----------------------------------------------|----------------------------------|----------------------------------------------|-------------------------------------------------|-------|
| <b>Program: B Tech CE/CS/IT</b>         |          |           |         | <b>Subject Code: CE0522</b>                  |                                  |                                              | <b>Semester: V</b>                              |       |
| <b>Teaching Scheme (Hours per week)</b> |          |           |         | <b>Examination Evaluation Scheme (Marks)</b> |                                  |                                              |                                                 |       |
| Lecture                                 | Tutorial | Practical | Credits | University Theory Examination                | University Practical Examination | Continuous Internal Evaluation (CIE)- Theory | Continuous Internal Evaluation (CIE)- Practical | Total |
| 3                                       | 0        | 2         | 4       | 40                                           | 40                               | 60                                           | 60                                              | 200   |

### Course Objectives:

1. To provide and enrich students with knowledge, skills and practical experience on client side scripting and mark up languages.
2. To introduce the concepts and techniques of problem solving through structured modular approaches.
3. To develop the ability to logically plan and develop web pages.
4. To empower members to create web applications that depends on the Model-View-Controller Architecture.
5. To enhance the skills of good programming style and discipline.

## CONTENTS

### UNIT-I

[12 hours]

#### Introduction:

Concept of WWW, Internet and WWW, URL, HTTP Protocol, Web browser and Web servers

#### HTML:

Basics of HTML and Tags, Introduction to HTML5, Evolution of HTML5, HTML 5: Deprecated Tags and New Tags, Events, Forms, SVG, Web Storage, Canvas, Audio and Video

## UNIT-II

[12 hours]

### **CSS:**

Basics of CSS , Introduction to CSS 3 , CSS 3 : Borders, Background, Text Effects , Fonts , Transformation , Transitions ,Animations , Multiple Columns , User Interface, Introduction to Boot Strap with CSS.

### **Java Script:**

Introduction of Java Script, Variables, Conditions, Looping, functions, Events, Cookies. Advance Java Script: Java Script Objects, Error Handling, Validation , Animation and Multimedia.

## UNIT-III

[12 hours]

### **Angular JS:**

Introduction , MVC Architecture , Directives , Expression , Controllers , Filters , Tables, HTML DOM , Modules , Forms ,AJAX , Scope and Services

### **Node JS:**

Introduction, Callback Concept, Event Driven Programming, Buffers, Streams, File System, Object, Modules and RESTFul API.

## UNIT-IV

[12 hours]

### **PHP :**

Introduction, Basic Syntax, Variables, Constants, Decision Making, Looping, Arrays, Strings, Functions, Web Concepts, GET & POST, Cookies, Sessions. Advance Concept: Regular Expression, Exception Handling, Forms, Object Oriented Programming with PHP.

### **MY SQL :**

Introduction to PHP MyAdmin, Connection to MySQL server from PHP, execution of MySQL queries from PHP, receiving data from database server and processing it on web server using PHP. Web Hosting.

### Course Outcomes:

At the end of this subject, students should be able to:

1. Gain the knowledge of www including browser and HTTP protocol.
2. Create dynamic web pages using a combination of HTML, CSS, and JavaScript, apply essential programming language concepts when creating HTML forms

3. Select an appropriate web hosting service, and publish your webpages for the world to see
4. To build dynamic web pages with usage of server-side scripting PHP and MySQL
5. Apply the knowledge of JavaScript/jQuery Programming for interactive front-end web development
6. To provide employability skills such as write, test, and debug web pages using HTML and JavaScript.

**Text Books:**

1. Developing Web Application, Ralph Moseley, -Wiley India
2. Black Book, HTML 5, Dreamtech Press

**Reference Books:**

1. Black Book, Web Technologies, Dreamtech Press
2. Beginning Node.js Apress
3. Angular: Up and Running: Learning Angular, Step by Step, O’reilly

**Web Resources**

1. <https://www.w3schools.com/html/default.asp>
2. <https://nptel.ac.in/courses/106105084/>
3. <https://www.tutorialspoint.com/nodejs/index.htm>
4. <https://www.tutorialspoint.com/angularjs/index.htm>

**LIST OF EXPERIMENTS**

| Experi<br>ment.<br>No. | Title                                                                                                                                                               | Learning Outcomes               |
|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|
| 1.1                    | Introduction to web 3.0, website, web portal, domain name, networking concepts. Introduction to internet, hosting of website, server configurations and maintenance | Learn the concepts of Web.      |
| 1.2                    | Create a website layout using table structure which consist of space/locations for Logo, Search, News, Events, Content area, etc.                                   | To study implementation of tags |



|      |                                                                                                                                                                                                                                                                                                                                        |                                                |
|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|
| 1.3  | Make resume with the help of Basic HTML Tags                                                                                                                                                                                                                                                                                           | To know various HTML tags and its use.         |
| 1.4  | Write HTML Code to display student registration form.                                                                                                                                                                                                                                                                                  | To learn HTML functionalities                  |
| 2.1  | Use CSS in resume which was made using only HTML tags.                                                                                                                                                                                                                                                                                 | Know the concepts of CSS                       |
| 2.2  | Write the following styles in separate CSS file and also show how to link this CSS file in HTML file.<br><br>(a) The headings should have normal font style and font size should be 120%.<br><br>(b) Apply a background image “abcd.jpg”. Write a paragraph about it and define a class arial for paragraph which defines font family. | To study the link between CSS and HTML         |
| 3.1  | Write a Javascript code to build a calculator.                                                                                                                                                                                                                                                                                         | To learn Javascript coding concepts and usages |
| 3.2  | Write a Javascript program to calculate area of triangle and rectangle.                                                                                                                                                                                                                                                                | To learn Javascript coding concepts and usages |
| 3.3. | Write a Javascript to take 2 digit number and then separate this two digits then multiply first digit by itself for second digit times.(Exa: 23, Output: 2 is multiply 3 times answer is: 8)                                                                                                                                           | To learn Javascript coding concepts and usages |
| 4.1  | Create a basic Book Directory Project using Nodejs and APIs.                                                                                                                                                                                                                                                                           | To study concepts of Nodejs and APIs           |
| 4.2  | Using Angular JS features make a shopping list/To-do list where you can add or remove items.                                                                                                                                                                                                                                           | To study concepts of Angular JS                |
| 5.1  | PHP based web application to understand data retrieval on server side                                                                                                                                                                                                                                                                  | To study concepts of server side programming   |
| 5.2  | Include, require, date functions in php.                                                                                                                                                                                                                                                                                               | To learn use of php                            |
| 5.3  | Develop PHP web application using session and cookie.                                                                                                                                                                                                                                                                                  | To learn use of php                            |
| 5.4  | Understand PHP MyAdmin.                                                                                                                                                                                                                                                                                                                | To learn use of php                            |
| 5.5  | Implement php application to store employee records in MySQL database                                                                                                                                                                                                                                                                  | To learn use of php with database              |

|     |                                                        |                                                             |
|-----|--------------------------------------------------------|-------------------------------------------------------------|
| 5.6 | Create a login application using session and Database. | To learn use of php with database                           |
| 6.1 | Minor Project                                          | To learn how to work on real world Applications and project |

**Program - B. Tech (Computer Engineering)**

| <b>SEMESTER - VI</b> |        |                                                  |               |                        |             |            |                    |                          |            |                  |            |              |                |
|----------------------|--------|--------------------------------------------------|---------------|------------------------|-------------|------------|--------------------|--------------------------|------------|------------------|------------|--------------|----------------|
| <b>Sr. No.</b>       |        | <b>Name of the subject</b>                       | <b>Credit</b> | <b>Teaching Scheme</b> |             |            |                    | <b>Evaluation Scheme</b> |            |                  |            |              | <b>Segment</b> |
|                      |        |                                                  |               | <b>(per week)</b>      |             |            |                    | <b>Theory</b>            |            | <b>Practical</b> |            | <b>Total</b> |                |
|                      |        |                                                  |               |                        |             |            |                    | <b>CIE</b>               | <b>ESE</b> | <b>CIE</b>       | <b>ESE</b> | <b>Marks</b> |                |
|                      |        |                                                  |               | <b>Th.</b>             | <b>Tut.</b> | <b>Pr.</b> | <b>Total (hr.)</b> | <b>Th.</b>               | <b>Th.</b> | <b>Pr.</b>       | <b>Pr.</b> |              |                |
| 1                    | CE0616 | Software Engineering with UML                    | 4             | 3                      | 0           | 2          | 5                  | 60                       | 40         | 60               | 40         | 200          | Core           |
| 2                    | CE0617 | Theory of Computation                            | 4             | 4                      | 0           | 0          | 4                  | 60                       | 40         | 0                | 0          | 100          | Core           |
| 3                    | CE0630 | Data Science                                     | 4             | 3                      | 0           | 2          | 5                  | 60                       | 40         | 60               | 40         | 200          | PE             |
|                      | CE0631 | Information Retrieval                            |               |                        |             |            |                    |                          |            |                  |            |              |                |
|                      | CE0632 | Web Data Management                              |               |                        |             |            |                    |                          |            |                  |            |              |                |
| 4                    | CE0618 | Advanced Java Technology                         | 4             | 3                      | 0           | 2          | 5                  | 60                       | 40         | 60               | 40         | 200          | PE             |
|                      | CE0619 | Advance .Net Framework                           |               |                        |             |            |                    |                          |            |                  |            |              |                |
|                      | CE0628 | Mobile Application Development ( Android & iOS ) |               |                        |             |            |                    |                          |            |                  |            |              |                |
| 5                    | CE0629 | Data Compression                                 | 4             | 3                      | 0           | 2          | 5                  | 60                       | 40         | 60               | 40         | 200          | PE             |
|                      | CE0633 | Distributed Systems                              |               |                        |             |            |                    |                          |            |                  |            |              |                |
|                      | CE0634 | Cryptography & Network Security                  |               |                        |             |            |                    |                          |            |                  |            |              |                |
| 6                    |        | <i>Open Elective 7</i>                           | 3             | 3                      | 0           | 0          | 3                  | 60                       | 40         | 0                | 0          | 100          | OE             |
|                      |        | <i>Research Guided Seminar</i>                   | 2             | 0                      | 2           | 0          | 2                  | 100                      | 0          | 0                | 0          | 0            | HS             |
|                      | CE0622 | Internet of Things                               | 4             | 3                      | 0           | 2          | 5                  | 60                       | 40         | 60               | 40         | 200          | ES             |
|                      |        | <b>TOTAL</b>                                     | <b>29</b>     | <b>22</b>              | <b>2</b>    | <b>10</b>  | <b>34</b>          | <b>520</b>               | <b>280</b> | <b>300</b>       | <b>200</b> | <b>1200</b>  |                |

**Subject: Software Engineering with UML**

**Program: B. Tech Computer Engineering**

**Subject Code: CE0616**

**Semester: VI**

**Teaching Scheme (Hours per week)**

**Examination Evaluation Scheme (Marks)**

| Lecture | Tutorial | Practical | Credits | University Theory Examination | University Practical Examination | Continuous Internal Evaluation (CIE)-Theory | Continuous Internal Evaluation (CIE)-Practical | Total |
|---------|----------|-----------|---------|-------------------------------|----------------------------------|---------------------------------------------|------------------------------------------------|-------|
| 03      | 00       | 02        | 04      | 40                            | 40                               | 60                                          | 60                                             | 200   |

### Course Objectives

1. Be successful professionals and entrepreneur in the field with solid fundamental knowledge of software engineering.
2. Utilize and exhibit strong communication and interpersonal skill development, as well as professional and ethical principles when functioning as members and leaders of multi-disciplinary teams.
3. Apply their foundations in software engineering to adapt to readily changing environments using the appropriate theory, principles, and processes for employability in industries and entrepreneurship.
4. To gain the techniques and skills on how to use modern software testing tools to support software testing projects that lead them to employability in the industry.
5. To expose Software Process Improvement and Reengineering.

### CONTENTS

#### UNIT-I

[12 hours]

#### **Introduction to Software and Software Engineering**

The Evolving Role of Software, Software: A Crisis on the Horizon and Software Myths, Software Engineering: A Layered Technology, Software Process Models, The Linear Sequential Model, The RAD Model, Evolutionary Process Models: Prototyping Model, Spiral Model, The Concurrent Development Model, Agile Process Model, Component-Based Development, Process, Product and Process.

#### UNIT-II

[12 hours]

#### **Requirement Analysis and Specification**

Requirement Analysis and Specification Understanding the Requirement, Requirement Modeling, Requirement Specification (SRS), Characteristics of SRS, How to write a Software Requirement Specification (SRS), Requirement Analysis and Requirement Elicitation, Requirement Engineering. Software design concepts and Design principals, Architectural

Design, Component Level Design, Function Oriented Design and Data flow Diagram, drawing rules, Leveling of DFD Level 0, Level 1, Level 2

### **UNIT-III**

**[12 hours]**

#### **Project Management Concepts & Project Metrics**

Project Management Concepts & Project Metrics: The Management Spectrum, People, Product, Process, Project, The W5HH Principle, Metrics in the Process and Project Domains (FP & LOC), Software Measurement, Metrics for Project Software Project Software Metrics (Process, Product and Project Metrics), Software Project Estimations, Software Project Planning (MS Project Tool), Project Scheduling & Tracking, Project Planning Objectives, and Software Project Estimation using COCOMO Model.

#### **Risk Analysis & Quality Management**

Risk Identification, Risk Projection, Risk Refinement, Risk Mitigation. Quality Assurance and Management Quality Concepts and Software Quality Assurance, Software Reviews Formal Technical Reviews.

### **UNIT-IV**

**[12 hours]**

#### **Software Testing and Advanced Topics**

Software Testing Fundamentals and Test Case Design, White-Box Testing, Black-Box Testing and Gray Box Testing Strategies, Testing Techniques and Test Case, Functional Testing & its types: Unit testing, System testing, Integration Testing, Interface Testing, Regression Testing, Alpha Testing & Beta Testing, Smoke Testing and Sanity Testing. Non-Functional Testing & its types: Performance Testing, Load Testing, Security Testing, Scalability Testing, Stress Testing, Volume Testing, Compatibility Testing, Recovery Testing

#### **Advanced Topics in Software Engineering**

Introduction to Reengineering, Reverse engineering, Agile Development, Introduction to Scrum framework, Kanban framework.

### **Course Outcomes**

At the end of this subject, students should be able to:

1. Prepare Software Requirement Specification document.
2. Prepare Software Project Management Plan document.
3. Apply the concept of Functional Oriented and Object-Oriented Approach for Software Design.
4. Recognize how to ensure the quality of software product, different quality standards and software review techniques.
5. Apply various testing techniques and test plans.
6. Will be Able to understand modern Agile Development and Service Oriented Architecture Concept of Industry.

**Text Books:**

1. Roger S. Pressman, Software engineering- A practitioner's Approach, McGraw-Hill International Editions.
2. Ian Sommerville, "Software Engineering", 7th Edition, Pearson Education, Asia

**Reference Books:**

1. Pankaj Jalote, Software Engineering – A Precise Approach Wiley.
2. RajibMall, Fundamentals of software Engineering, Prentice Hall of India.
3. Engineering Software as a Service An Agile Software Approach, Armando Fox and DavidPatterson
4. John M Nicolas, Project Management for Business, Engineering and Technology,Elsevier
5. Software Engineering Fundamentals by Ali Behhforoz & Frederick Hudson OXFORD

**Web Resources:**

1. [https://onlinecourses.nptel.ac.in/noc20\\_cs68/preview](https://onlinecourses.nptel.ac.in/noc20_cs68/preview)
2. <https://www.win.tue.nl>
3. <https://www.onesmartclick.com/engineering/software-engineering.html>
4. <https://devops.com/most-popular-open-source-devops-tools/>
5. <https://www.guru99.com/devops-tutorial.html>

**LIST OF EXPERIMENTS**

| <b>Experi<br/>ment<br/>No.</b> | <b>Title</b>                                                                                                                                                                                                                                                                                              | <b>Learning<br/>Outcomes</b> |
|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|
| 1                              | Study of different software engineering models.<br>Waterfall model, Prototype model, Incremental model, Spiral model and RAD Models, Scrum Model.<br>Select any application for which software development process can be defined and find out which process model will be more suitable for application. | CO1,CO5                      |
| 2                              | Prepare Software Requirement Specification (SRS) document for chosen application                                                                                                                                                                                                                          | CO1,CO2                      |
| 3                              | Draw E-R diagram and class diagram for chosen application                                                                                                                                                                                                                                                 | CO3                          |

|    |                                                                                                                                                                                    |     |
|----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| 4  | Write Use case Scenario and draw Use Case Diagram for chosen application.                                                                                                          | CO3 |
| 5  | Draw Activity diagram for selected application.                                                                                                                                    | CO3 |
| 6  | Draw sequence diagram for selected application.                                                                                                                                    | CO3 |
| 7  | Draw Data Flow Diagram (DFD) for selected application                                                                                                                              | CO3 |
| 8  | Apply FP oriented estimation model for selected application.                                                                                                                       | CO4 |
| 9  | Study of various software testing methods and design test cases for selected application                                                                                           | CO5 |
| 10 | Study of any two Open source tools in DevOps for Infrastructure Automation, ConfigurationManagement, Deployment Automation, Performance Management, Log Management and Monitoring. | CO6 |

**Subject: Theory of Computation**

**Program: B. Tech CE**

**Subject Code: CE0617**

**Semester: VI**

| Teaching Scheme (Hours per week) |          |           |         | Examination Evaluation Scheme (Marks) |                                  |                                              |                                                 |       |
|----------------------------------|----------|-----------|---------|---------------------------------------|----------------------------------|----------------------------------------------|-------------------------------------------------|-------|
| Lecture                          | Tutorial | Practical | Credits | University Theory Examination         | University Practical Examination | Continuous Internal Evaluation (CIE)- Theory | Continuous Internal Evaluation (CIE)- Practical | Total |
| 3                                | 0        | 0         | 4       | 40                                    | 0                                | 60                                           | 0                                               | 100   |

### Course Objectives:

1. To provide basic understanding of the lexical phase of compiler design.
2. To provide the knowledge about Regular Languages & develop the skill to design of finite automata and its different types.
3. To provide the knowledge about Context Free Language, and develop the skill to design of Push down Automata
4. To provide the knowledge about designing and working of Turing Machine and its complexity

## CONTENTS

### UNIT-I

[12 hours]

**Basics:** Sets, Logic formulas, Functions and Relations, Basic mathematical notations, Basics of alphabet, string, languages and grammars, Mathematical induction and recursive definitions.

### UNIT-II

[12 hours]

Regular Languages and Finite Automata: Regular language and regular expressions, Deterministic finite automata, Minimization of finite automata, Operations on Finite automata, Nondeterministic Finite Automata, Conversion of NFA to DFA, NFA- $\epsilon$ , Conversion of NFA- $\epsilon$  to NFA and DFA, Kleene's Theorem, Pumping lemma for regular Languages.



### **UNIT-III**

**[12 hours]**

Context Free Grammar (CFG): Introduction to CFG, Derivation and Parse Tree, Ambiguity in CFG, Left factoring and Left Recursion, Simplification of CFG, Linear Grammar, Normal Forms (GNF and CNF), Applications of CFG Push-Down Automata (PDA): Introduction of PDA, DPDA and NPDA, Construction of PDA from CFG and vice versa, Parsing.

### **UNIT-IV**

**[12 hours]**

Turing Machines (TM): Introduction to TM, Variations of TM, Non deterministic TM, Universal TM, Two Stack PDA and Turing machine, Models of Computation and the Church Turing Thesis, Types of complexity, Different Notations, Complexity Classes, P and NP problems, Polynomial time reducibility

### **Course Outcomes:**

At the end of this subject, students should be able to:

1. Design Deterministic finite automata, Nondeterministic finite automata, conversion of NFA to DFA, design of Epsilon- NFA and regular expressions
2. Obtain minimized DFA and convert automata to regular expressions and regular expression to automata and proving languages are not regular, master context free languages, push-down automata.
3. Write CFG's, construction of parse trees, finding and removing ambiguity in grammars, designing problems on Pushdown Automata.
4. Convert grammar to Chomsky Normal Form and conversion of grammar to PDA. Prove that languages are not context free using pumping lemma
5. Design Turing machines; understand the working of various types of Turing machines and solving problems through it.
6. Understand the broad overview of the theoretical foundation behind computing.

### **Text Books:**

1. Introduction to languages and Theory Of Computation by John C. Martin, Third Edition, TMH Publication.
2. Introduction to Automata theory, Formal Languages and Computations by Shyamalendu Kandar, Pearson Publication.

**Reference Books:**

1. Formal Languages and Automata Theory by C.K. Nagpal, Oxford Publication
2. Automata theory, Languages and computation by Hopcroft, Motwani, Ullman, Pearson Education

**Web Resources:**

1. <http://nptel.iitm.ac.in/courses/106104028/>
2. <http://www.cse.iitb.ac.in/~supratik/courses/cs331/>
3. <http://nptel.iitm.ac.in/courses/106106049/>



INDUS INSTITUTE OF TECHNOLOGY & ENGINEERING

Constituent Institute of Indus University

Subject: Data Science

Program: B. Tech CE/CSE/IT

Subject Code: CE0630

Semester: VI

Teaching Scheme (Hours per week)

Examination Evaluation Scheme (Marks)

| Lecture | Tutorial | Practical | Credits | University Theory Examination | University Practical Examination | Continuous Internal Evaluation (CIE)- Theory | Continuous Internal Evaluation (CIE)- Practical | Total |
|---------|----------|-----------|---------|-------------------------------|----------------------------------|----------------------------------------------|-------------------------------------------------|-------|
| 3       | 0        | 2         | 4       | 40                            | 40                               | 60                                           | 60                                              | 200   |

### Course Outcome:

1. Learn the fundamentals of data analytics and the data science pipeline
2. Learn how to scope the resources required for a data science project
3. Apply principles of Data Science to the analysis of business problems.
4. Skill development in data mining software to solve real-world problems.
5. Increase in employability in cutting edge tools and technologies to analyze Big Data.

## CONTENTS

### UNIT-I

[12 Hours]

#### Introduction to data science:

Defining Data Science, what do data science people do? Data Science in Business, Use Cases for Data Science, Data science and Big data, Data science and Machine learning

Data Science Process Overview – Defining goals – Retrieving data – Data preparation – Data exploration – Data modeling – Presentation.

## UNIT-II

[12 Hours]

### **Introduction to statistics:**

What is statistics, Descriptive Statistics: Introduction, Population and sample, Types of variables, Measures of central tendency, Measures of variability, Coefficient of variance, Skewness and Kurtosis

### **Inferential Statistics:**

Normal distribution, Test hypotheses, Central limit theorem, Confidence interval, T-test, Type I and II errors

## UNIT-III

[12 Hours]

### **Machine Learning Introduction and Concepts:**

Machine learning – Modeling Process – Training model – Validating model – Predicting new observations

Important machine learning terminologies, Types of machine learning algorithms, Supervised learning algorithms: Types of supervised learning algorithms, Regression: Linear Regression, Classification algorithms

Unsupervised learning algorithms: Clustering algorithms

## UNIT-IV

[12 Hours]

**Introduction to data visualization** – Data visualization options – Filters – Python libraries for visualization – Matplotlib- seaborn

Data Science Ethics – Doing good data science – Owners of the data - Valuing different aspects of privacy - Getting informed consent - The Five Cs – Diversity – Inclusion – Future Trends.

### **Course Outcome:**

After completion of the course students will be able to:

- 1) Demonstrate knowledge of big data analytics.
- 2) Demonstrate the ability to think critically in making decisions based on data
- 3) Interpret data, extract meaningful information, and assess findings.
- 4) Identify and analyze social, legal, and ethical issues in data science.
- 5) Choose and apply tools and methodologies to solve data science tasks.
- 6) Explore future trends in data.

**Text Books:**

1. Introducing Data Science, Davy Cielen, Arno D. B. Meysman, Mohamed Ali, Manning Publications Co., 1st edition, 2016
2. An Introduction to Statistical Learning: with Applications in R, Gareth James, Daniela Witten, Trevor Hastie, Robert Tibshirani, Springer, 1st edition, 2013
3. Ethics and Data Science, D J Patil, Hilary Mason, Mike Loukides, O' Reilly, 1st edition, 2018

**Reference Books:**

1. Machine Learning: A Probabilistic Perspective. Kevin P. Murphy.

**LIST OF EXPERIMENTS**

| <b>Sr. No.</b> | <b>Title</b>                                                                                                                                                                                                       | <b>Learning Outcome</b>                                                                                       |
|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|
| 1              | Getting Started with Skills Network Labs                                                                                                                                                                           | To know functionality and usage of Skill Network Labs environment                                             |
| 2              | Getting Started with Jupyter Notebooks                                                                                                                                                                             | To know functionality and usage of Jupyter Notebook platform                                                  |
| 3              | Getting Started with Apache Zeppelin Notebooks                                                                                                                                                                     | To know functionality and usage of Apache Zeppelin Notebook                                                   |
| 4              | Getting Started with RStudio IDE                                                                                                                                                                                   | Introduction to Rstudio and its usage in Machine Learning                                                     |
| 5              | Data Analysis with Python<br>Import data sets<br>Clean and prepare data for analysis<br>Manipulate pandas Data Frame<br>Summarize data<br>Build machine learning models using scikit-learn<br>Build data pipelines | To understand the concept of machine learning, data preparation, pandas and scikit-learn with model building. |

|   |                                                                                                                                                                                        |                                                                                       |
|---|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| 6 | Data Visualization with Python<br>Introduction to Visualization Tools<br>Basic Visualization Tools<br>Specialized Visualization Tools<br>Creating Maps and Visualizing Geospatial Data | To understand about the field of data visualization and tools used for visualization. |
| 7 | Advanced Visualization Tools                                                                                                                                                           | Study and understanding about functionalities of advanced visualization tools.        |



INDUS INSTITUTE OF TECHNOLOGY & ENGINEERING

Constituent Institute of Indus University

**Subject: Information Retrieval**

**Program: B. Tech CE/CSE/IT**

**Subject Code: CE0631**

**Semester: VI**

**Teaching Scheme (Hours per week)**

**Examination Evaluation Scheme (Marks)**

| Lecture | Tutorial | Practical | Credits | University Theory Examination | University Practical Examination | Continuous Internal Evaluation (CIE)- Theory | Continuous Internal Evaluation (CIE)- Practical | Total |
|---------|----------|-----------|---------|-------------------------------|----------------------------------|----------------------------------------------|-------------------------------------------------|-------|
| 3       | 0        | 2         | 4       | 40                            | 40                               | 60                                           | 60                                              | 200   |

**Course Objective:**

1. To develop a model for Text Indexing and Retrieval
2. To evaluate Information Retrieval Systems
3. To analyze Textual and Semi-Structured data sets
4. To learn Text Similarity Check Measures
5. To Understand Search Engines

**CONTENTS**

**UNIT-I**

**Introduction to Text Retrieval Systems**

**[06 hours]**

Retrieval System, Types of Retrieval Systems, Boolean Retrieval, Term Vocabulary Lists, Posting Lists, Index Compression

**UNIT-II**

**Information Retrieval Models**

**[16 hours]**

Vector Space Model, TF-IDF Weight Model, Evaluation of an Information Retrieval System, Okapi/BM25, Language Models, KL-Divergence, Page Ranking

### **UNIT-III**

#### **Query Expansion and Feedback**

**[06 hours]**

Query Expansion, Relevance Feedback, Pseudo Relevance Feedback, Query Reformation

### **UNIT-IV**

#### **Text Classification and Clustering**

**[20 hours]**

Text Classification Problem, Bayesian Classification, Support Vector Machine, Feature Selection, Flat Clustering, K-Means Clustering

#### **Course Outcomes:**

At the end of this subject, students should be able to:

- 1) Recognize Document as Vector and perform Text Analysis over the document
- 2) Perform Evaluation of the Information Retrieval Systems
- 3) Understand Search Engines and Page Ranking Techniques
- 4) Perform Supervised and Unsupervised Learning Techniques
- 5) Understand Relevance Feedback Mechanism in Search Optimization
- 6) Apply Text Classification & Clustering techniques

#### **Text Books:**

1. Christopher D. Manning, Prabhakar Raghavan and Hinrich Schütze, Introduction to Information Retrieval, Cambridge University Press. 2008.

#### **Reference Books:**

1. Cheng Xiang Zhai, Statistical Language Models for Information Retrieval (Synthesis Lectures Series on Human Language Technologies), Morgan & Claypool Publishers, 2008.

#### **Web Resources:**

- 1) <https://nlp.stanford.edu/IR-book/newslides.html>
- 2) <https://www.tutorialspoint.com/lucene/>



## LIST OF EXPERIMENTS

| <b>Sr. No.</b> | <b>Title</b>                                                          | <b>Learning Outcomes</b>                                                                                                                                  |
|----------------|-----------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1              | Introduction to Lucene Software                                       | To <i>develop</i> a model for Text Indexing and Retrieval                                                                                                 |
| 2              | Implementation of Basic Text Processing Techniques on a Text Document | To <i>analyze</i> Textual and Semi-Structured data sets, To <i>learn</i> Text Similarity Check Measures, To <i>evaluate</i> Information Retrieval Systems |
| 3              | Query Expansion and Ranking in Lucene                                 | To <i>analyze</i> Textual and Semi-Structured data sets, To <i>learn</i> Text Similarity Check Measures, To <i>evaluate</i> Information Retrieval Systems |
| 4              | Implementation of Language Model with Smoothing Techniques            | To <i>analyze</i> Textual and Semi-Structured data sets, To <i>learn</i> Text Similarity Check Measures, To <i>evaluate</i> Information Retrieval Systems |
| 5              | Introduction to RStudio                                               | To <i>develop</i> a model for Text Indexing and Retrieval                                                                                                 |
| 6              | Implementation of Naïve Bayes Classifier in RStudio                   | To <i>apply</i> techniques for Text Classification and Clustering                                                                                         |
| 7              | Implementation of K-Means Algorithm in RStudio                        | To <i>apply</i> techniques for Text Classification and Clustering                                                                                         |
| 8              | Case Study: Search Engine                                             | To <i>Understand</i> Search Engines                                                                                                                       |

| <b>Subject: Web Data Management</b>     |                 |                  |                |                                              |                                                 |                                                                     |                                                                        |              |
|-----------------------------------------|-----------------|------------------|----------------|----------------------------------------------|-------------------------------------------------|---------------------------------------------------------------------|------------------------------------------------------------------------|--------------|
| <b>Program: B. Tech CE/CSE/IT</b>       |                 |                  |                | <b>Subject Code: CE0632</b>                  |                                                 |                                                                     | <b>Semester: VI</b>                                                    |              |
| <b>Teaching Scheme (Hours per week)</b> |                 |                  |                | <b>Examination Evaluation Scheme (Marks)</b> |                                                 |                                                                     |                                                                        |              |
| <b>Lecture</b>                          | <b>Tutorial</b> | <b>Practical</b> | <b>Credits</b> | <b>University<br/>Theory<br/>Examination</b> | <b>University<br/>Practical<br/>Examination</b> | <b>Continuous<br/>Internal<br/>Evaluation<br/>(CIE)-<br/>Theory</b> | <b>Continuous<br/>Internal<br/>Evaluation<br/>(CIE)-<br/>Practical</b> | <b>Total</b> |
| <b>3</b>                                | <b>0</b>        | <b>2</b>         | <b>4</b>       | <b>40</b>                                    | <b>40</b>                                       | <b>60</b>                                                           | <b>60</b>                                                              | <b>200</b>   |

### Course Objective:

1. Understand the basic concept of web data management using XML.
2. To learn Xpath and XQuery to find appropriate data from XML.
3. To learn the current technology stack (URIs, XML, RDF/S, OWL) in web data management.
4. To understand test on an ontology and schema mappings
5. To learn different tools for semantic data management

## CONTENTS

### UNIT-I

[12 hours]

#### **Data Model**

Introduction to Modeling Web Data, Semistructured data, XML, Web Data Management with XML, XML Standards, XML and syntax, XML Data Model, XLink, and XPointer.

#### **XPath and XQuery**

Introduction, Basics of XPath and XQuery, XPath: Steps and path expressions, Evaluation of path expressions, Generalities on axes and node tests, Axes, Node tests and abbreviations, Predicates, XPath 2.0; FLWOR expressions in XQuery: Defining variables - the for and let clauses, Filtering - the where clause, The return clause, Advanced features of XQuery; XPath foundations.

## **UNIT-II**

[12 hours]

### **Typing**

Motivating Typing, Automata, Schema Languages for XML, Typing Graph Data: Graph Semi structured Data, Graph Bisimulation, Data guides.

### **XML Query Evaluation**

XML fragmentation, XML identifiers: Region-based identifiers, Dewey-based identifiers, Structural identifiers and updates; XML evaluation techniques: Structural join, Optimizing structural join queries, Holistic twig joins

## **UNIT-III**

[12 hours]

### **Ontologies, RDF, and OWL**

Introduction, Ontologies by example, Web resources, URI, namespaces, RDF, RDFS: RDF Schema, OWL, Ontologies and (Description) Logics.

### **Querying Data through Ontologies.**

Introduction, Querying RDF data: notation and semantics, Querying through RDFS ontologies, Answering queries through DL-LITE ontologies

## **UNIT-IV**

[12 hours]

### **Data Integration**

Introduction, Containment of conjunctive queries, Global-as-view mediation, Local-as-view mediation, Ontology-based mediators, Peer-to-Peer Data Management Systems.

### **Building Web scale applications**

Web search, web crawlers, web information retrieval, Web graph mining and hot topics in web search, Distributed systems, failure management, required properties of a distributed system, P2P networks, Hash-based structures, distributed indexing, Distributed computing with MapReduce.

### **Course Outcomes:**

After successful completion of this course, student will be able to

- 1) Learn the overall vision of the Semantic Web
- 2) Analyzed the current technology stack and design for future (URIs, XML, RDF/S, OWL).
- 3) To understand how one could use these technologies for building something useful.
- 4) Design test an ontology and define schema mappings.
- 5) Use different tools for semantic data management
- 6) Understand the concept of MapReduce technique in distributed computing.

### **Text Books:**

- 1) Bhavani Thuraisingham, “Web Data Management and Electronic Commerce”, CRC Press, 2000
- 2) Bhavani Thuraisingham, “XML Databases and the Semantic Web”, CRC Press, 2002

### **Reference Books:**

- 1) Serge Abite boul, IoanaManolescu, Philippe Rigaux, Marie-Christine Rousset and Pierre Senellart, “Web Data Management”, Cambridge University Press, 2011
- 2) Athena Vakali and George Pallis, “Web Data Management Practices: Emerging Techniques and Technologies”, IGI Publishing, 2007, ISBN-10: 1599042282; ISBN-13: 978-1599042282

### **Web Resources**

- 1) <https://nptel.ac.in/courses/111104100/16>
- 2) <https://www.coursera.org/learn/data-management-cloud>
- 3) <https://www.classcentral.com/tag/data-management>

### **LIST OF EXPERIMENTS**

| <b>Sr. No</b> | <b>Title</b>                                                                                                                                                                                              | <b>Learning Outcome</b>            |
|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|
| <b>1</b>      | Create an XML file defining an article in newspaper.                                                                                                                                                      | Create an XML File                 |
| <b>2</b>      | Create an XML file containing list of students. Also create stylesheet file to display list in an HTML format.                                                                                            | Create Stylesheet                  |
| <b>3</b>      | Create an XML file containing list of students. Using XPath display following information<br>• Information of a student with ID No : 101<br>• All the student in the sorted order according to their CGPA | Using XPath display                |
| <b>4</b>      | Create an XForm to collect information from staff member regarding their publications. Details like Year of Publication, National/International, Title, Conference/Journal etc.                           | Using XForm to collect information |
| <b>5</b>      | From the above gathered information, using XQuery find out the number of publication in a specific year.                                                                                                  | Using XQuery                       |
| <b>6</b>      | Demonstrate the use of AJAX.                                                                                                                                                                              | Usage if AJAX                      |
| <b>7</b>      | Study of XMLSPY tool.                                                                                                                                                                                     | Study of XMLSPY                    |

|           |                                                                                          |                                              |
|-----------|------------------------------------------------------------------------------------------|----------------------------------------------|
| <b>8</b>  | Create an RSS for the events occurring in your institute                                 | Create an RSS                                |
| <b>9</b>  | Write a program to read the articles in RSS created in above practical.                  | Read article in RSS                          |
| <b>10</b> | Study of RDF (Resource Description Framework)                                            | Study of RDF                                 |
| <b>11</b> | Create a system which can use of Web search, web crawlers and web information retrieval. | To create a system for information retrieval |
| <b>12</b> | Analyze and implement a system with Web graph mining.                                    | Implement system for Web graph mining        |
| <b>13</b> | Implement and Subscribe RSS News feeds to get latest news in India                       | Implement and subscribe RSS News Feeds       |

**Subject: Advance Java Technology**

**Program: B. Tech CE/CS/IT**

**Subject Code: CE0618**

**Semester: VI**

| Teaching Scheme (Hours per week) |          |           |         | Examination Evaluation Scheme (Marks) |                                  |                                              |                                                 |       |
|----------------------------------|----------|-----------|---------|---------------------------------------|----------------------------------|----------------------------------------------|-------------------------------------------------|-------|
| Lecture                          | Tutorial | Practical | Credits | University Theory Examination         | University Practical Examination | Continuous Internal Evaluation (CIE)- Theory | Continuous Internal Evaluation (CIE)- Practical | Total |
| 3                                | 0        | 2         | 4       | 40                                    | 40                               | 60                                           | 60                                              | 200   |

### Course Objectives:

1. To provide and enrich students with knowledge of Enterprise Java standards and architectures.
2. To introduce the concepts and techniques of problem solving through structured Modular approaches.
3. To implement application over the web or network.
4. To cultivate good programming style and discipline. To improve the team work qualities.
5. To understand concept and application of spring and struts framework.
6. By learning the skills of Advance Java Technology students get more employable in the field of Software Development

## CONTENTS

### UNIT-I

**[12 hours]**

#### **Introduction to J2EE and Overview of Web Development:**

Concept of Java Technology, J2EE Architectures, Java EE Components and Containers, Types of Servers in J2EE Application. Concept of HTTP Protocols and API, Request Processing in Web Application, Web Application Structure, Web Containers, and Web based MVC architecture.

#### **JDBC:**

Introduction to JDBC, Architecture of JDBC, JDBC driver types, steps for connecting to JDBC, Types of Statements in JDBC (Statement Interface, Prepared Statement, Callable Statement),

Types of Result Set, Executing SQL Queries, Meta Data, JDBC Exception, Transaction Management.

## **UNIT-II**

**[12 hours]**

### **Servlet API:**

Introduction to Servlet, Life Cycle of Servlet, HTTP Methods Structure and Deployment descriptor, ServletContext and ServletConfig Object, Request and Response objects, ServletCollaboration, Servlet Annotations, Session Tracking, Filters API, Connecting Servlet API to JDBC.

### **JSP:**

Introduction to JSP, Compare JSP with Servlet, JSP page life cycle, JSP architecture, JSP elements, JSP Implicit Objects, Expression Language, JSP Standard Tag Libraries, JSP Custom Tag, JSP Session Management, JSP Exception Handling, JSTL

## **UNIT-III**

**[12 hours]**

### **Network Programming:**

Basic of Network Programming, Introduction of Socket, Types of Socket, Socket API, TCP/IP client sockets, java.net package Socket, Datagram's, URL, TCP/IP server sockets, RMI Architecture, Client Server application using RMI.

### **Java Mail:**

Introduction, Protocols used in Java Mail, Architecture of Java Mail, Sending and Receiving Email.

### **Hibernate Framework:**

Introduction, Architecture, Object Relational Mapping in Hibernate, Hibernate annotations, Hibernate Query Language.

## **UNIT-IV**

**[12 hours]**

### **Spring Framework:**

Introduction, Spring Architecture, Spring MVC Module, Bean Life Cycle, Constructor Injection, Dependency Injection, Inner Beans, Aliases in Bean, Bean Scopes, Spring Annotation. Spring AOP Module, Spring DAO, Database Transaction Management, CRUD Operation using DAO and Spring API

### **Struts Framework:**

Introduction, features, core component, Struts2 Architecture, Action, Struts2 Configuration, Interceptors, Struts2 Validation (Custom & Bundled Validation)

## **Course Outcome:**

After successful completion of the course, student will able to:

1. Demonstrate the working of web applications and able to work in web development environment
2. Understanding various java frameworks and its applications, so student can able to decide future way in interested framework
3. Develop both client side and server side programming.
4. Graphical user interface in Java programs and able to work in GUI design requirement in industry.
5. Know MVC Architecture concept in practical .so they able to design secure application.
6. Different classes for database framework and OR Mapping and able to design dynamic application with database

## **Text Books:**

1. Java 6 Programming, Black Book, Dreamtech
2. Java Server Programming, Java EE6 (J2EE 1.6), Black Book, Dreamtech
3. Java Programming Advance Topics, Joe Wigglesworth and Paula McMillan, Cengage Learning.

## **Reference Books:**

1. Professional Java Server Programming, a Apress
2. Core Java, Volume II – Advanced Features, Eight Edition, Pearson
3. Unleashed Java 2 Platform, Sams Techmedia
4. The Complete Reference J2EE, Keogh, McGrawHill
5. Java EE 5 for beginners, Bayross and Shah, SPD
6. JDBC 3 Java Database Connectivity, Bernand Van Haecke, Wiley-dreamtech
7. Java Server Pages for Beginners, Bayross and Shah, SPD
8. Java Servlet Programming, Jason Hunter, SPD (O'Reilly)

## **Web Resources:**

1. <https://www.javatpoint.com/what-is-framework-in-java>
2. <https://www.javatpoint.com/java-swing>
3. <https://www.tutorialspoint.com/spring/index.htm>
4. <https://www.javatpoint.com/spring-tutorial>



## LIST OF EXPERIMENTS

| <b>Sr. No.</b> | <b>Class Activity</b> | <b>List of Practical</b>                                                                                                              | <b>Learning Outcomes</b>                                           |
|----------------|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|
| 01             | Lab 1                 | Web server, Introduction to JSP (print hello word), Dynamic table printing using JSP (use color change)                               | Students know Basic Concept of JSP.                                |
| 02             | Lab 2                 | Data forwarding and manual URL building, Learning JSP page directive (any one)                                                        | Student know concept of URL building through JSP.                  |
| 03             | Lab 3                 | CRUD operation using Cookie, Cookie management tool (Cookie table with delete and update button)                                      | Students can able store data in cookies in Java application.       |
| 04             | Lab 4                 | Demonstrating five methods of session, Shopping cart using session                                                                    | Student can able to understand practical concept of session.       |
| 05             | Lab 5                 | Login using session (static username & password), Create Registration form using type-1 database connectivity                         | Student can understand login concept of any web application.       |
| 06             | Lab 6                 | List all the records of a table using type-2 db connectivity driver, Search engine using type-2 database connectivity                 | Student can understand database connectivity with java application |
| 07             | Lab 7                 | Introduction to Servlet (folder structure-generic servlet-http servlet-lifecycle-deployment descriptor file)                          | Student can understand servlet life cycle by practical             |
| 08             | Lab 8                 | Create a browser specific page hit counter using servlet, Using single HTTP Servlet create a form and insert a record into database.. | Student can create servlet application.                            |

|    |        |                                                                                                                                                                   |                                                                            |
|----|--------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------|
| 09 | Lab 9  | Parameter passing in servlet, Create an application specific page hit counter in which the counter value should remain as it is even though we restart the server | Student can able to create servlet application                             |
| 10 | Lab 10 | Demonstrate web base MVC architecture using JSP, Servlet and JavaBean, Introduction to swing (blank frame-FlowLayout-button)                                      | Student understand concept MVC architecture                                |
| 11 | Lab 11 | Pluggable look and feel using JButton, Swing + Database                                                                                                           | Student can understand concept of swing and able to design GUI Application |
| 12 | Lab 12 | Learning TCP connection using java, Learning UDP connection using JAVA                                                                                            | Student can understand concept of network programming                      |
| 13 | Lab 13 | Demonstrating the use and architecture of RMI app                                                                                                                 | Understand concept of RMI                                                  |
| 14 | Lab 14 | Implementing internationalization in JAVA, Learning hibernate configuration and architecture                                                                      | Understand concept of hibernate.                                           |
| 15 | Lab 15 | Insert, delete, update n select records using hibernate, Hibernate annotations                                                                                    | Understand database connectivity in hibernate.                             |

**Subject: Advanced .NET Framework**

**Program: B. Tech CE/CS/IT**

**Subject Code: CE0619**

**Semester: VI**

**Teaching Scheme (Hours per week)**

**Examination Evaluation Scheme (Marks)**

| Lecture | Tutorial | Practical | Credits | University Theory Examination | University Practical Examination | Continuous Internal Evaluation (CIE)- Theory | Continuous Internal Evaluation (CIE)- Practical | Total |
|---------|----------|-----------|---------|-------------------------------|----------------------------------|----------------------------------------------|-------------------------------------------------|-------|
| 3       | 0        | 2         | 4       | 40                            | 40                               | 60                                           | 60                                              | 200   |

### Course Objective:

1. Understand Basic architecture of ASP.NET and how to provide the connectivity.
2. Ideas for basic namespaces, Object oriented Concepts and database connection.
3. Understand concept of master pages and themes for any application.
4. Learn to use of web service for web application.
5. Identify debug issues related to the development of concurrent programs.
6. Learn the skills of web development which makes them industry ready.

## CONTENTS

### UNIT-I

[12 hours]

**C# .Net** : Namespaces, Constructor and Destructor- Using parameterized constructor in class, creating copy constructor, calling a destructor in class, Function Overloading and inheritance-Function overloading, Inheritance, Modifiers, Properties and indexers-creating read and write property, creating read only property, creating a static property, Attributes, Reflection API-Events and Delegates.

**Asp.Net:** Introduction to ASP.NET Framework, Difference between ASP and ASP .Net, lifecycle of an Asp.Net Web page- difference stages of asp.net page, ASP.Net page life cycle, Working with Asp.net pages, Exploring the concepts of code behind page model, Explain View state, Working with post back, Working with Controls, Working with validation control, Using Rich server control, Working in user control in asp.net.

### UNIT-II

[12 hours]

#### **Managing State and Master Pages and Themes**

**Managing State:** Preserving state in web application, Page level state, using cookies to preserve state, ASP.Net session state, Storing objects in session state, configuring session state, storing session state in sql server, using cookie less session IDs, Application state.

**Master Pages and Themes:** Master Pages-Simple and Nested Master pages, Working with content Placeholder and Nested master Page-Creating simple master page, Creating nested master page.Asp.Net Themes: Working with CSS and Skin files.

### **UNIT-III**

**[12 hours]**

**Data Bound Controls and Repeater Controls:** Overview of List Bound Controls- List box, Dropdown list, Checkbox list, Radio Buttonlist, Gridview, Listview, Creating Repeater control, Creating datalist control

**Introduction to ADO.Net:** Benefits of ADO.Net, ADO.Net compared to classic ADO, ADO.Net Objects and Namespaces, Managed Providers, Disconnected Data Access- Disconnected Data Access with IDE, Disconnected Data Access without IDE, Connected Data Access, Data Binding- Manual Data binding, simple data binding, complex data binding ,Types Dataset.

### **UNIT-IV**

**[12 hours]**

**Creating and Consuming Web and Advance .Net Concepts.**

**Creating and Consuming Web:** The motivation of XML web services, Designing of XML Web services, Creating XML Web services with visual studio, Creating Web service consumer, Discovering web service using UDDI.

**Advance .Net Concepts:** Introduction of WPF, Introduction of WCF, Exploring Silverlight, and Introduction of AJAX

#### **Course Outcome:**

After learning, the course the students should be able to:

- 1) Use .NET framework architecture, various tools, data bound control and Validation techniques for dynamic application.
- 2) Use of different templates available in Visual Studio for asp.net application
- 3) Implementation testing strategies in real time applications.
- 4) Design and develop complex concurrent programs using the .NET framework
- 5) Use advanced concepts related to Web Services, WCF, and WPF in project development.
- 6) Develop a website after learning all the concepts, knowledge gained from above subject could be further implemented into advanced level projects in coming semesters.

#### **Text Books:**

- 1) ASP.NET 2.0, Black Book, Dreamtech
- 2) ASP .NET Complete Reference, TMH
- 3) C# the Basic by Vijay Mukhi

## Reference Books:

- 1) Advance .Net Technology, Dreamtech Edition, Chirag Patel
- 2) ASP.NET Developer's Guide – Greg Buczek, McGraw Hill
- 3) Programming VB.Net 2005, Julia Case Bradley, Anita Millsbaugh, McGraw Hill

## Web Resources

- 1) <https://www.tutorialsteacher.com/mvc/asp.net-mvc-tutorials>
- 2) <https://www.tutorialspoint.com/asp.net/>
- 3) <https://dotnet.microsoft.com/learn/dotnet/architecture-guides>
- 4) <https://www.javatpoint.com/asp-net-tutorial>

## LIST OF EXPERIMENTS

| Experiment. No. | Title                                                                                                                                 | Learning Outcome                                 |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|
| 1               | Create a website to pass username and password from one page to another within a query string. and Check if its valid or invalid user | Username and Password creation                   |
| 2               | Create a website applying an external skin file to a given webpage.                                                                   | Apply external skin file in webpage              |
| 3               | Create a webpage using checkbox, checkbox list, and radio button.                                                                     | Apply checkbox, checkbox list, and radio button. |
| 4               | Create a webpage performing Image upload, Adrotator as well as a Date & Time display Calender                                         | Use Image upload, adorator and Calendar          |
| 5               | Create a website showing the usage of a Menustrip within a webpage                                                                    | To understand Menu strip usage                   |
| 6               | Create a website performing Multiview output within a webpage                                                                         | To use feature of multiview output               |
| 7               | Create a website performing validation within a form.                                                                                 | To apply concept of validation in form.          |
| 8               | Create a website showing implementation of master pages                                                                               | To implement master pages in website             |
| 9               | Create a website in which Multiview is used.                                                                                          | To use the multiview feature in website          |

|    |                                                                                                  |                                            |
|----|--------------------------------------------------------------------------------------------------|--------------------------------------------|
| 10 | Create a website demonstrating State management within a webpage.                                | To create website for state management     |
| 11 | Create a website implementing the usage of web services from external sources within a web page. | To implement usage of web services         |
| 12 | Demonstrate connected-disconnected state of a database.                                          | Demonstration of both states               |
| 13 | Create a webpage demonstrating structure of MDI form.                                            | Demonstrate structure of MDI form          |
| 14 | Create a webpage demonstrating structure of Registration Page                                    | Demonstrate structure of Registration Page |
| 15 | Creating Web services for addition of two numbers                                                | To create web services                     |

| <b>Subject: Mobile Application Development (Android &amp; IOS)</b> |          |           |         |                                              |                                  |                                              |                                                 |       |
|--------------------------------------------------------------------|----------|-----------|---------|----------------------------------------------|----------------------------------|----------------------------------------------|-------------------------------------------------|-------|
| <b>Program: B. Tech CE/CS/IT</b>                                   |          |           |         | <b>Subject Code: CE0628</b>                  |                                  |                                              | <b>Semester: VI</b>                             |       |
| <b>Teaching Scheme (Hours per week)</b>                            |          |           |         | <b>Examination Evaluation Scheme (Marks)</b> |                                  |                                              |                                                 |       |
| Lecture                                                            | Tutorial | Practical | Credits | University Theory Examination                | University Practical Examination | Continuous Internal Evaluation (CIE)- Theory | Continuous Internal Evaluation (CIE)- Practical | Total |
| 3                                                                  | 0        | 2         | 4       | 40                                           | 40                               | 60                                           | 60                                              | 200   |

### Course Objectives:

1. Design and develop the basic application programs.
2. Describe, identify and debug issues related to the development of application.
3. Create a customized control application with different UI components which helps to develop skills in mobile application development.
4. Design and develop the database needed for the storing data of application.
5. Understand the different states of mobile application

## CONTENTS

### UNIT-I

[12 hours]

#### The Basics:

**Hello World:** Intro to Android, Why develop app for Android?, Flavors of Android operating systems, Challenges of developing for Android (multiple OS, need backwards compatibility, need to consider performance and offline capability)

**Concept: Create Your First Android App:** Overview of the development process - Java, Android Studio, Project layout in Android Studio, Target and minimum SDKs, Android Virtual Device (AVD) Monitor, Viewing logs in logcat and AVD, Android manifest file, App Architecture: An app consists of one or more activities. For an activity, write Java code and layout xml, and hook them together, and register the activity in the manifest file.

**Concept: Layouts, Views and Resources:** Layout elements can be viewed and edited in Layout Editor and XML, Introduction to the range of UI elements, Resources (layouts, strings, styles, themes), Identifying resources with IDs, Programmatically referencing, resources using resource IDs, on Click attribute, Getting user input from a view, Programmatically changing UI elements, Layout Managers, Defining layouts for activities, inflating the layout

**Concept: Scrolling Views:** How to make activities scrollable: compare ScrollView, ListView, RecyclerView, Getting the resource ID for a UI element by inflating a layout (needed for RecyclerView), How to implement RecyclerView (requires layout managers and ViewHolders), Performance implications of different kinds of scrolling UI elements

**Concept: Resources to Help You Learn:** Resources to help you learn: Samples that ship with the SDK, Templates for projects, developer.android.com, Android developer blog, Android developer YouTube channel, Source code and samples in github, Stack overflow, Google search!

**Activities and Intents :** About activities, Defining Activities, Activity Lifecycle, Activity navigation, About intents, Explicit vs Implicit intents, Passing info to new activity, Returning data from activity

**The Activity Lifecycle and Managing State:** Activity lifecycle, Activity lifecycle callback methods, Activity instance state.

**Starting Activities with Implicit Intents:** Starting activities by sending implicit intents, Intent filters and enabling your activities to receive intents, ShareCompat.

**Testing and Debugging, and Backwards Compatibility:** Debugging your apps, Testing your app, Support libraries

## UNIT-II

[12 hours]

### **User Interface:**

**User Input Controls:** Getting user input, Changing keyboards, Buttons, Dialogs and pickers, Spinners, checkboxes, and radio buttons

**Menus:** Options menu, contextual menus (floating and action bar), and popup menu, Adding menu items. Handling on Clicks from menus.

**Screen Navigation:** Terminology, Different ways a user can navigate through an app, Action bar, Settings menu, Navigation drawer, Directed workflow (funnels), Best practices for navigation



**Themes and Styles:** Best practices for themes and styles, Performance benefits for themes, When and how to use drawables, best practices for drawables, When and how to use nine-patches, best practices for nine-patches, Tools for creating drawables.

**Material Design:** What is material design? Material design best practices. Material Design guidelines, Implementing Material Design look and feel, with compatibility with previous versions, Support library for Material Design , Transitions and Animations

**Adapt layouts for multiple devices and orientations:** Why we need to consider different screen sizes and orientations , Screen density (dip or dp), How to create adaptive layouts using resources folders , Different ways to create images that scale nicely, Images and image formats and how they affect performance (download speeds).

**Accessibility:** Why accessibility matters, Accessibility considerations: Color blindness, poor vision, poor hearing, physical limitations, Accessibility guidelines, testing for accessibility, Screen readers, making your app more accessible: Color and Contrast, button size Material Design guidelines, considerate layouts and navigation

**Localization:** How to prep your app for localization, LTR and RTL (eg Arabic) text.

**Testing the User Interface:** Automated testing of UIs, User testing your UI with real users, Using the Espresso and UI Automator frameworks for testing UIs

### UNIT-III

[12 hours]

#### **Background Tasks:**

##### **Connect to the Internet: Background Tasks**

Synchronous versus async tasks, what is the UI thread and when should you use it? , Example of a background task - retrieving data over the internet, Creating background tasks. (Schedule, send data, etc.) , Implementing AsyncTask (doInBackground(), callbacks) , Limitations of AsyncTask , Passing info to background tasks, Initiating background tasks, Scheduling background tasks (intro only, more later).

##### **Connecting to the Internet:**

Permissions, Building URIs, Opening and closing Internet connections, Parsing JSON in Android. (Because it's common.) , Sending requests and parsing response.

##### **AsyncTaskLoader:**

Intro to AsyncTaskLoader , loadInBackground() , AsyncTaskLoader callbacks , Benefits of loaders

#### **Broadcast Receivers:**

What is a Broadcast Receiver and a Broadcast Intent? , Broadcast Receiver Security and Lifecycle

#### **Services:**

What is a service? Long running task without a UI, Difference between Activity and Service , Start and stop services, Lifecycle methods, Foreground services, IntentService class, App priority (critical, high, low), How to create a new Service.

### **Notifications:**

What is a Notification? , Notification Design Guidelines.

**Triggering, Scheduling, and Optimizing Background:** AlarmManager

### **Storing Data in your app:**

Internal versus external storage, Privacy, sharing, security, encryption of your data , Shared Preferences: Store private primitive data in key-value pairs , SQLite Databases: Store structured data in a private database , Store data on the web with your own network server, Firebase for storing and sharing data in the cloud, Concept: Preferences , What are Settings and Preferences? , Settings best practices (harder to take away settings than to add, for usability reasons, Storing and retrieving preferences as key/value pairs using SharedPreferences, Different Settings types, Settings menu, Using Activity and PreferenceFragments to allow users to set preferences

### **Store data using SQLite database:**

Overview of SQLite,OpenHelper Android class, Querying (dev) Searching (user) databases, Best practices for using databases in Android, Best practices for testing your database

**Using Content Resolvers to access data:** Content Providers and Content Resolvers work together, what is a content provider? , What is a content resolver? , How do they work together? , How to implement and use Content Resolvers

**Content Providers:** When to implement content providers , How to implement content providers (overview), Content URIs , UriMatcher, Content Provider authorities , Required methods on ContentProvider (query, insert, delete, update) , MIME types , Contracts , Making content provider data accessible to other apps by modifying manifest, and protecting data with permissions.

**Using Loaders to Load and Display Data:** Using loaders to asynchronously load data into an activity or fragment, Benefits of Loaders -- why use them? , Loader states (started, stopped, reset) , LoaderManager , Methods & callbacks to implement in Loaders: loadInBackground(), deliverResult() onStart/StopLoading(), onReset/Cancelled()),Registering listeners , Using CursorLoader with ContentProviders

## **UNIT-IV**

**[12 hours]**

**Fundamentals of iOS:** Overview of MAC OS and X-CODE, Introduction to iPhone Architecture, Essential COCOA Touch Classes, Interface Builder, Nib File, COCOA and MVC Framework, Overview of features of latest iOS.

**iPhone application development:** Auto Layout, Views, Outlets and Actions, Different View Controller: single view Controller, Master-Detail View Controller, Navigation View Controller, Managing Application Memory, Application delegate, Handling Keyboard Input, UI Controllers: Label, Button, Text Field, Slider, Switch, Progress View, Page Control, Table View, Collection View, Image View, Text View, Web View, Map View, Date Picker, Picker View, Search Bar, Gestures, push notification, Image Picker, QR Code Scanner, Audio and Video.

### **Course Outcomes:**

At the end of this subject, students should be able to:

1. Understand the existing state of mobile app development via researching existing apps, meeting with industry professionals, and formulating new ideas.
2. Understand the limitations and features of developing for mobile devices.
3. To be able to create mobile applications involving data storage in SQLite and other database tools.
4. Create a complete Mobile app with a significant programming component, involving the sensors and hardware features of the phone.
5. Build their ability to develop software with reasonable complexity on the android platform.
6. Design & Develop iphone and ipad application.

### **Text Books:**

1. Android Programming (Big Nerd Ranch Guide), by Phillips, Stewart, Hardy and Marsicano.
2. Android Programming – Pushing the limits by Hellman

### **Reference Books:**

1. Programming Android: Java Programming for the New Generation of Mobile Devices 2nd, Kindle eBook by Zigurd Mednieks (Author), G. Blake Meike (Author), Laird Dornin (Author).
2. Professional Android 4 Application Development Paperback – 2012 by Reto Meier
3. Learning Android Paperback – 2014 by Gargenta Marko


### **Web Resources:**

1. <https://www.youtube.com/watch?v=SLNTnJkg6EE>
2. <https://www.youtube.com/watch?v=taSwS5rhtmc>
3. <https://www.youtube.com/watch?v=myjSxtAk9XM>
4. <https://www.youtube.com/watch?v=odqACn2Vgic>

## LIST OF EXPERIMENTS

| Experi<br>ment.<br>No. | Title                                                                                                                                                                                                                                                                                                              | Learning<br>Outcomes                   |
|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|
| 1.                     | Basic of Android Programming                                                                                                                                                                                                                                                                                       |                                        |
| 1.1                    | To print “hello world” using string.xml file.                                                                                                                                                                                                                                                                      | Understand about basic of android IDE  |
| 1.2                    | Android Life Cycle - Android system initiates its program within an Activity starting with a call on onCreate() callback method. There is a sequence of callback methods that start up an activity and a sequence of callback methods that tear down an activity as shown in the below Activity life cycle program | Understand about how application work. |
| <b>2.</b>              | <b>User Interface</b>                                                                                                                                                                                                                                                                                              |                                        |
| 2.1                    | Different ways of handling button click event.<br><br><ul style="list-style-type: none"> <li>a. Specifying the function in xml file:</li> <li>b. MainActivity implements listener class</li> <li>c. Anonymous Inner Class</li> </ul>                                                                               | CO2                                    |
| 2.2                    | Arithmetic Operations<br><br>(Addition, Subtraction, Division, Multiplication)                                                                                                                                                                                                                                     | CO2,CO3                                |
| 2.3.                   | Custom Toast & Dialog Box                                                                                                                                                                                                                                                                                          | CO2                                    |
| 2.4                    | UI Controls ( Android AutoCompleteTextView , Android spinner , Android progress bar , Image Button, Toggle Button, Button, CheckBox, RadioGroup, Raadio Button)                                                                                                                                                    | CO2                                    |
| <b>3.</b>              | <b>Background Task</b>                                                                                                                                                                                                                                                                                             |                                        |
| 3.1                    | Implicit Intent - Messages wiring components together. The source and destination for the content transfer are not known. Only the task and the action to be performed are known.                                                                                                                                  | CO3                                    |
| 3.2                    | Explicit Intent - Messages wiring components together. The source and destination are known as well as the task and actions to be performed are known.                                                                                                                                                             | CO3                                    |
| 3.3                    | SMS Sending – Message can be sent using 2 methods – using                                                                                                                                                                                                                                                          | CO3                                    |

|           |                                                                                                               |             |
|-----------|---------------------------------------------------------------------------------------------------------------|-------------|
|           | Intent, using SMS Manager.                                                                                    |             |
| 3.4       | Plotting a location on Google Map                                                                             | CO2,CO3     |
| 3.5       | GPS Tracking                                                                                                  | CO2,CO3     |
| 3.6       | Implement the concept of Async Task in Android App                                                            | CO2,CO3     |
| 3.7       | Implement the concept of Shared preference in Android.                                                        | CO1,CO2,CO3 |
| 3.8       | Demonstrate the use of shared preference as session in Android                                                | CO2,CO3     |
| <b>4</b>  | <b>Database</b>                                                                                               |             |
| 4.1       | Create Login & Registration Form using Sqlite Database                                                        | CO2,CO3     |
| 4.2       | Create an Android App to display student details in ListView (using Database helper class and Adapter class). | CO2,CO3     |
| 4.3       | Create an Android App to display student details in ListView (List must contain image and textview)           | CO2,CO3     |
| 4.4       | Implement the concept of Insert, Update and Delete Student facilities using fragment and database helper      | CO2,CO3     |
| <b>5.</b> | <b>Multimedia</b>                                                                                             |             |
| 5.1       | Playing audio files in Android App                                                                            | CO3         |
| 5.2       | Playing video files in Android App.                                                                           | CO3         |
| <b>6.</b> | <b>iOS Practical</b>                                                                                          |             |
| 6.1       | Installation of x-code on MAC                                                                                 | CO4         |
| 6.2       | Write an application to demonstrate the use of table control & views.                                         | CO4         |
| 6.3       | Write an i-phone application which can play audio and video files                                             | CO4         |

|  <b>INDUS UNIVERSITY</b><br>ज्ञानेन प्रकाशते जगत् |          |           |         | <b>INDUS INSTITUTE OF TECHNOLOGY &amp; ENGINEERING</b><br>Constituent Institute of Indus University |                                  |                                              |                                                 |       |
|------------------------------------------------------------------------------------------------------------------------------------|----------|-----------|---------|-----------------------------------------------------------------------------------------------------|----------------------------------|----------------------------------------------|-------------------------------------------------|-------|
| <b>Subject: Distributed Systems</b>                                                                                                |          |           |         |                                                                                                     |                                  |                                              |                                                 |       |
| <b>Program: B. Tech CE/CSE/IT</b>                                                                                                  |          |           |         | <b>Subject Code: CE0633</b>                                                                         |                                  |                                              | <b>Semester: VI</b>                             |       |
| <b>Teaching Scheme (Hours per week)</b>                                                                                            |          |           |         | <b>Examination Evaluation Scheme (Marks)</b>                                                        |                                  |                                              |                                                 |       |
| Lecture                                                                                                                            | Tutorial | Practical | Credits | University Theory Examination                                                                       | University Practical Examination | Continuous Internal Evaluation (CIE)- Theory | Continuous Internal Evaluation (CIE)- Practical | Total |
| 3                                                                                                                                  | 0        | 2         | 4       | 40                                                                                                  | 40                               | 60                                           | 60                                              | 200   |

**Course Outcome:**

1. To understand foundations of Distributed Systems.
2. To understand the concepts of Remote Communication and Interprocess Communication
3. To study about various distributed client server models
4. To create an awareness of the major technical challenges in distributed systems design and implementation.
5. Know about emerging trends in distributed computing.

**CONTENTS**

**UNIT-I**

**[12 hours]**

**Introduction Distributed System Concepts:**

Introduction, Distributed Computing Models, Software Concepts, Issues in Designing Distributed Systems ,Client-Server Model , Case Studies: WWW 1.0 , 2.0 , 3.0, Protocols for Distributed Systems, Examples of Distributed Systems–Trends in Distributed Systems

## UNIT-II

[12 hours]

### **Distributed computing paradigm and model:**

Inter process Communication – the API for internet protocols – External data representation and Multicast communication. Network virtualization: Overlay networks. Case study: MPI Remote Method Invocation And Objects: Remote Invocation – Introduction – Request-reply protocols – Remote procedure call – Remote method invocation. Case study: Java RMI – Group communication – Publish-subscribe systems – Message queues – Shared memory approaches – Distributed objects – Case study: Enterprise Java Beans -from objects to components.

## UNIT-III

[12 hours]

### **Peer to Peer Utilities:**

Peer-to-peer Systems – Introduction – Napster and its legacy – Peer-to-peer – Middleware – Routing overlays. Overlay case studies: Pastry, Tapestry- Distributed File Systems –Introduction – File service architecture – Andrew File system. File System: Features-File model -File accessing models – File sharing semantics Naming: Identifiers, Addresses, Name Resolution – Name Space Implementation – Name Caches – LDAP

## UNIT-IV

[12 hours]

### **Duplication and Synchronization:**

Introduction – Clocks, events and process states – Synchronizing physical clocks- Logical time and logical clocks – Global states – Coordination and Agreement – Introduction – Distributed mutual exclusion – Elections – Transactions and Concurrency Control– Transactions -Nested transactions – Locks – Optimistic concurrency control – Timestamp ordering – Atomic Commit protocols - Distributed deadlocks – Replication – Case study – Coda.

### **Process Management:**

Process Migration: Features, Mechanism – Threads: Models, Issues, Implementation. Resource Management

### **Course Outcomes:**

At the end of this subject, students should be able to:

1. Understand the need and requirements of Distributed System
2. Discuss trends in Distributed Systems.

3. Apply network virtualization.
4. Apply remote method invocation and objects.
5. Design process and resource management systems.
6. Understand application of Distributed Systems

**Text Books:**

1. Distributed Systems: Principles and Paradigms, A S Tanenbaum & Martin Stee, 2/E,PHI, 2006
2. Distributed Systems Concepts & Design, Colouris, Dollimore, Kindberg, Pearson
3. Distributed Computing, Sunita Mahajan and Seema Shah, Oxford University
4. Distributed Operating Systems by P. K. Sinha, PHI

**Reference Books:**

1. Distributed Systems: Principles and Paradigms, Tanenbaum
2. Distributed Computing, Fundamentals, Simulations and Advanced topics, 2nd Edition, Hagit Attiya
3. Distributed Systems: Concepts and Design, G. Coulouris, J. Dollimore, and T. Kindberg,
4. Java Network Programming & Distributed Computing by David Reilly, Michael Reill

**Web Resources**

1. <https://nptel.ac.in/courses/Distributed System>

**LIST OF EXPERIMENTS**

| Exper<br>iment.<br>No. | Title                                                      | Learning Outcomes                               |
|------------------------|------------------------------------------------------------|-------------------------------------------------|
| 1                      | Write a program to implement hello world service using RMI | Students will get hands on practice about RMI . |
| 2                      | Write a program to implement calculator using RMI          | Students will get hands on practice about RMI . |
| 3                      | Write a program to implement time service using RMI        | Students will get hands on practice about RMI . |



|    |                                                                     |                                                                |
|----|---------------------------------------------------------------------|----------------------------------------------------------------|
| 4  | Write a program to implement hello world service using RPC          | Students will get hands on practice about RPC .                |
| 5  | Write a program to implement date service using RPC                 | Students will get hands on practice about RPC .                |
| 6  | Write a program to implement Echo SOCKET in JAVA                    | Students will get hands on practice about SOCKET Programming . |
| 7. | Write a program to implement Echo server using RPCGEN               | Students will get hands on practice about RPCGEN .             |
| 8  | Write a program to implement producer-consumer concept using THREAD | Understand threading.                                          |
| 9. | Write a program to find the length of string using THREAD           | Understand threading.                                          |

**Subject: Internet of Things**

**Program: B. Tech CE/CS/IT**

**Subject Code: CE0622**

**Semester: VI**

| Teaching Scheme (Hours per week) |          |           |         | Examination Evaluation Scheme (Marks) |                                  |                                              |                                                 |       |
|----------------------------------|----------|-----------|---------|---------------------------------------|----------------------------------|----------------------------------------------|-------------------------------------------------|-------|
| Lecture                          | Tutorial | Practical | Credits | University Theory Examination         | University Practical Examination | Continuous Internal Evaluation (CIE)- Theory | Continuous Internal Evaluation (CIE)- Practical | Total |
| 3                                | 0        | 2         | 4       | 40                                    | 40                               | 60                                           | 60                                              | 200   |

### Course Objectives

1. Introduce evolution of internet technology and need for IoT.
2. Train the students to build IoT systems using sensors, single board computers and open source IoT platforms that help in skill development.
3. To identify the design, development and security challenges in IoT Systems.
4. To study IoT Applications in Different Domains and be able to measure their performance that enhances the employability skills of students.
5. To implement basic IoT Applications on Embedded Platforms to enhance entrepreneurship skills in students.

## CONTENTS

### UNIT-I

[12 hours]

#### Introduction to IoT

Defining IoT, Characteristics of IoT, Physical design of IoT, Logical design of IoT, Functional blocks of IoT, Communication models & APIs, Machine to Machine, IoT versus Machine to Machine, Challenges in IoT: Design challenges, Development challenges, Security challenges

**Application of IoT:** Home automation, Industry applications, Surveillance applications

## **UNIT-II**

**[12 hours]**

**IoT Reference Architecture-** Getting Familiar with IoT Architecture, Various architectural views of IoT such as Functional, Information, Operational and Deployment.

**Constraints affecting design in IoT world-** Introduction, Technical design Constraints.

**Web Infrastructure for managing IoT Resources:** Introduction, Open IoT Architecture for IoT/Cloud Convergence, Scheduling Process and IoT Service Lifecycle, Device/Cloud Collaboration Framework

## **UNIT-III**

**[12 hours]**

**Internet of Things Privacy, Security and Governance:** Introduction, Overview of Governance, Privacy and Security Issues, Contribution from FP7 Projects, Security, Privacy and Trust in IoT-Data-Platforms for Smart Cities, First Steps Towards a Secure Platform, Smartie Approach. Data Aggregation for the IoT in Smart Cities and Security.

## **UNIT-IV**

**[12 hours]**

**PREPARING IOT PROJECTS:** Interoperability in IoT, Introduction to Arduino Programming, Integration of Sensors and Actuators with Arduino, Introduction to Python programming, Introduction to Raspberry Pi, Implementation of IoT with Raspberry Pi.

### **Course Outcomes**

At the end of this subject, students should be able to:

1. Explain the Principles of Internet of Things
2. Design and develop IoT based sensor systems.
3. Employ IoT Solutions to Real Time Engineering Problems
4. Familiar with the Data Management Techniques, Architectures and various key enablers to enable practical IoT systems
5. Identify the Challenges and Research Scope in Communication Protocols used in IoT Applications.
6. Solve IoT security problems using light weight cryptography

**Text Books:**

1. Internet of Things Principles and Paradigms, Edited By Rajkumar Buyya, Amir Vahid Dastjerdi, Morgan Kaufmann, ELSEVIER
2. Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stamatis Karnouskos, Stefan Avesand, David Boyle, “From Machine to Machine to Internet of Things”, Elsevier Publications, 2014

**Reference Books:**

1. Fundamentals of Wireless Sensors Networks Theory and Practice, Walteneus Dargie and Christian Poellabauer, WILEY Series
2. Rethinking the Internet of Things A Scalable approach to connecting everything, Francis daCosta, Apress Open
3. Arduino Cookbook, Michael Margolis, O’Reilly
4. Internet of Things – From Research and Innovation to Market Deployment, Edited By Ovidiu Vermesan and Peter Friess, River Publishers

**Web Resources:**

1. NPTEL Lecture: <https://nptel.ac.in/courses/106105166/>

**LIST OF EXPERIMENTS**

| <b>Experim ent. No.</b> | <b>Title</b>                                                                                                                                                      | <b>Learning Outcomes</b> |
|-------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| 1                       | Familiarization with Arduino/Raspberry Pi and perform necessary software installation.                                                                            | CO-1                     |
| 2                       | To interface Push button/Digital sensor (IR/LDR) with Arduino/Raspberry Pi and write a program to turn ON LED when push button is pressed or at sensor detection. | CO-2,3                   |
| 3                       | Interface analog sensor (PIR Sensor, temperature sensor LM35, Ultrasonic Sensor) with - Arduino                                                                   | CO-2                     |
| 4                       | To interface Bluetooth with Arduino/Raspberry Pi and write a program to turn LED ON/OFF when ‘1’/’0’ is received from a smart phone using Bluetooth.              | CO-2,3                   |
| 5                       | To install MySQL database on Raspberry Pi and perform basic SQL queries.                                                                                          | CO-3,4                   |
| 6                       | Write a program on Arduino/Raspberry Pi to publish temperature data to MQTT broker.                                                                               | CO-1,3                   |

|    |                                                                                                                                 |        |
|----|---------------------------------------------------------------------------------------------------------------------------------|--------|
| 7  | Write a program on Arduino/Raspberry Pi to retrieve temperature and humidity data from thingspeak cloud.                        | CO-3,4 |
| 8  | Write a program to create a TCP server on Arduino/Raspberry Pi and respond with humidity data to the TCP client when requested. | CO-4,5 |
| 9  | Creating a webpage and display the values available through Arduino                                                             | CO-4,5 |
| 10 | Open Ended Experiment-Mini Project: Working on any IOT Application                                                              | CO-5,6 |

**Subject: Data Compression**

**Program: CE/CS/IT**

**Subject Code: CE0629**

**Semester: VI**

**Teaching Scheme (Hours per week)**

**Examination Evaluation Scheme (Marks)**

| Lecture | Tutorial | Practical | Credits | University Theory Examination | University Practical Examination | Continuous Internal Evaluation (CIE)-Theory | Continuous Internal Evaluation (CIE)-Practical | Total |
|---------|----------|-----------|---------|-------------------------------|----------------------------------|---------------------------------------------|------------------------------------------------|-------|
| 3       | 0        | 2         | 4       | 40                            | 40                               | 60                                          | 60                                             | 200   |

### **Course Objectives:**

1. To make known to students to basic applications, concepts, and techniques of Data compression.
2. To develop skills for using recent data compression software to solve practical problems in a variety of disciplines.
3. To gain experience doing independent study and research.
4. Improve fundamental understanding of data compression methods for text, images, and video and related issues in the storage, access, and use of large data sets.
5. Select and give reasons that are sensitive to the specific application and particular circumstance, most appropriate compression techniques for text, audio, image and video information

## **CONTENTS**

### **UNIT-I**

**[12 hours]**

### **Compression Techniques**

Lossless Compression, Lossy Compression, Measures of Performance Mathematical Preliminaries for Lossless Compression Models : Physical Models, Probability Models, Markov Models, Composite Source Model Coding, Uniquely Decodable Codes, Prefix Codes, Algorithmic Information Theory, Minimum Description Length Principle, Huffman Coding, The Huffman Coding Algorithm, Minimum

Variance Huffman Codes, Adaptive Huffman Coding, Applications of Huffman Coding, Lossless Image Compression, Text Compression and Audio Compression

## **UNIT-II**

[12 hours]

### **Arithmetic Coding Introduction**

Coding a Sequence, Generating a Tag, Deciphering the Tag, Generating a Binary Code, Uniqueness and Efficiency of the Arithmetic Code, Algorithm Implementation, Integer Implementation, Comparison of Huffman and Arithmetic Coding, Adaptive Arithmetic Coding

## **UNIT-III**

[12 hours]

### **Dictionary Techniques**

Static Dictionary Diagram, Coding Adaptive Dictionary the LZ77 Approach the LZ78 Approach Applications File Compression —UNIX compress Image Compression—The Graphics Interchange Format (GIF) Image Compression—Portable Network Graphics (PNG) Compression over Modems — V.42 bis

## **UNIT-IV**

[12 hours]

### **Lossless Compression**

Standards zip, gzip, bzip, unix compress, GIF, JBIG. Image & Video compression Basis functions and transforms from an intuitive point, JPEG, MPEG, Vector Quantization, case study of WinZip, WinRar Wavelet based compression Fundamentals of wavelets, various standard wavelet bases, Multi resolution analysis and scaling function and JPEG 2000.

### **Course Outcomes**

At the end of this subject, students should be able to:

1. Understand importance of data compression.
2. Develop a reasonably sophisticated data compression application.
3. Select methods and techniques appropriate for the task.
4. Develop the methods and tools for the given task.
5. Illustrate the concept of various algorithms for compressing text, audio, image and video information.
6. To develop a research oriented thinking in the area of Data Compression.

**Text Books:**

1. Introduction to Data Compression, Khalid Sayood, Morgan Kaufmann
2. The Data Compression book, Mark Nelson, Jean Loup Gaily

**Reference Books:**

1. Data Compression: “The Complete Reference”, David Saloman, Springer.
2. An Introduction to Information Retrieval, Christopher D. Manning, Prabhakar Raghavan, Hinrich Schütze, Cambridge University Press, Cambridge, England.

**Web Resources:**

1. <https://www.barracuda.com/glossary/data-compression>
2. <https://developer.mozilla.org/en-US/docs/Web/HTTP/Compression>
3. <http://www.data-compression.info/>

**LIST OF EXPERIMENTS**

| <b>Experi<br/>ment.<br/>No.</b> | <b>Title</b>                                                                                                                                                                                                                        | <b>Learning<br/>Outcomes</b>   |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| <b>1.1</b>                      | Write a program that compresses and displays uncompressed windows BMP image file.                                                                                                                                                   | Basic Knowledge of compression |
| <b>1.2</b>                      | Write a program to generate binary code in case of arithmetic coding.                                                                                                                                                               | Basic Knowledge of compression |
| <b>1.3</b>                      | Write a program to count the occurrences of different letters by reading the given text file and also find the probability of each letter with number of bits required for them using the formula:<br>No. of bits= $1/\log_2$ prob. | Basic Knowledge of compression |
| <b>1.4</b>                      | Write a Program to check whether the given code is prefix or not.                                                                                                                                                                   | Basic Knowledge of compression |
| <b>1.5</b>                      | Write a program to determine whether the set of given codes is uniquely decodable or not.                                                                                                                                           | Basic Knowledge of compression |



|            |                                                                                                                  |                                           |
|------------|------------------------------------------------------------------------------------------------------------------|-------------------------------------------|
| <b>2.</b>  | <b>Arithmetic and Huffman Coding</b>                                                                             |                                           |
|            | Write a program to generate binary code in case of arithmetic coding.                                            | Knowledge of Arithmetic compression       |
| <b>2.1</b> | Implement Huffman Code (HC) to generate binary code when symbol and probabilities are given                      | Knowledge of Huffman compression          |
| <b>3.</b>  | <b>Arithmetic and Huffman Coding</b>                                                                             |                                           |
| <b>3.1</b> | Implement Huffman code which can compress given file and decompress compressed file                              | Knowledge of Huffman compression          |
| <b>3.2</b> | Implement adaptive Huffman program to compress decompressed file.                                                | Knowledge of Huffman compression          |
| <b>4</b>   | <b>Text Compression Techniques</b>                                                                               |                                           |
| <b>4.1</b> | Write a program to Implement LZ77 algorithm.                                                                     | Knowledge of Text Compression Techniques  |
| <b>4.2</b> | Write a program to Implement LZ55 algorithm.                                                                     | Knowledge of Text Compression Techniques  |
| <b>5.</b>  | <b>Text Compression Techniques</b>                                                                               |                                           |
| <b>5.1</b> | Write a program to Implement LZ78 algorithm                                                                      | Knowledge of Text Compression Techniques  |
| <b>6.</b>  | <b>Image Compression Techniques</b>                                                                              |                                           |
| <b>6.1</b> | Write a program which performs JPEG compression, process step by step for given 8x8 block and decompression also | Knowledge of Image Compression Techniques |

|            |                                         |                                                     |
|------------|-----------------------------------------|-----------------------------------------------------|
| <b>6.2</b> | Study of Speech Compression Techniques. | Knowledge of<br>Speech<br>Compression<br>Techniques |
|------------|-----------------------------------------|-----------------------------------------------------|

**Subject: Cryptography & Network Security**

**Program: B. Tech**

**Subject Code: CE0634**

**Semester: VI**

| Teaching Scheme (Hours per week) |          |           |         | Examination Evaluation Scheme (Marks) |                                  |                                              |                                                 |       |
|----------------------------------|----------|-----------|---------|---------------------------------------|----------------------------------|----------------------------------------------|-------------------------------------------------|-------|
| Lecture                          | Tutorial | Practical | Credits | University Theory Examination         | University Practical Examination | Continuous Internal Evaluation (CIE)- Theory | Continuous Internal Evaluation (CIE)- Practical | Total |
| 3                                | 0        | 2         | 4       | 40                                    | 40                               | 60                                           | 60                                              | 200   |

### Course Objectives

1. To understand various Cryptographic Techniques.
2. Acquire background on hash functions; authentication; firewalls; intrusion detection techniques.
3. To understand the various Security Applications.
4. To understand various protocols for network security to protect against the threats in the networks.
5. Identify and mitigate software security vulnerabilities in existing systems.

## CONTENTS

### UNIT-I

**[12 hours]**

**Fundamentals:** Basic objectives of cryptography, Security mechanisms, OSI Security Architecture, Classical Encryption techniques, Cipher principles, cryptanalysis, Attack models.

**Block ciphers:** Block cipher design principles and modes of operation, Feistel cipher structure, Data Encryption standard (DES), International Data Encryption Algorithm, Blowfish, variants of DES, AES with structure, its transformation functions, key expansion.

## UNIT-II

[12 hours]

**Public Key Cryptography:** Overview of Asymmetric Key Cryptography, RSA algorithm, its computational aspects and security, Elliptic Curve Cryptography, Knapsack Algorithm, Diffie-Hellman key Exchange, Man-in-Middle attack.

**Key management:** Key management and distribution, symmetric key distribution using symmetric and asymmetric encryptions, distribution of public keys.

## UNIT-III

[12 hours]

**Hash Function:** Message Authentication Codes, its requirements and security, MACs based on Hash Functions, Security of Hash Functions, Secure Hash Algorithm, HMAC, Digital Signature, its properties, requirements and security, various digital signature schemes (Elgamal and Schnorr), NIST digital Signature algorithm.

**Network Security:** Authentication Applications like Kerberos, X.509 Authentication Service, PGP.

## UNIT-IV

[12 hours]

**IP& Web Security:** IPSec architecture, Applications of IPSec, Benefits of IPSec, and IPSec protocols, Web Security threats, Secure Socket Layer, Secure Electronic Transaction.

**System Level Security:** Intrusion detection, Viruses and related Threats - Virus Counter measures, Firewall Design Principles, Trusted Systems.

### Course Outcomes

At the end of this subject, students should be able to:

1. To understand the fundamental principles of access control models and techniques, authentication and secure system design.
2. To understand and apply the various symmetric key algorithms and asymmetric key algorithms.
3. To understand the concepts of hashing with algorithms, digital signature and apply them.
4. To understand and use the message authentication and its requirement.
5. Analyze and design network security protocols.

- To acquire the hands-on skills and the knowledge required for job competency.

**Text Books:**

William Stallings, "Cryptography and Network Security - Principles and Practices", Prentice Hall of India, Third Edition, 2003.

**Reference Books:**

- Cryptography & Network Security, Forouzan, Mukhopadhyay, McGrawHill
- Cryptography and Network Security (2nd Ed.), Atul Kahate, TMH
- Information Systems Security, Godbole, Wiley-India
- Information Security Principles and Practice, Deven Shah, Wiley-India
- Bruce Schneier, "Applied Cryptography", John Wiley & Sons Inc, 2001.
- A. Das and C. E. Veni Madhavan, Public-Key Cryptography: Theory and Practice, Pearson Education Asia.

**Web Resources**

- Software: cryptool ([www.cryptool.org](http://www.cryptool.org))
- Software: Wireshark ([www.wireshark.org](http://www.wireshark.org))
- <http://www.cryptix.org/>
- [williamstallings.com/Extras/Security-Notes/](http://williamstallings.com/Extras/Security-Notes/)
- [www.cs.bilkent.edu.tr/~selcuk/teaching/cs519/](http://www.cs.bilkent.edu.tr/~selcuk/teaching/cs519/)
- <http://freevidelectures.com/Course/3027/Cryptography-and-Network-Security>
- [http://cs.brown.edu/courses/csci1510/2013\\_lectures.html](http://cs.brown.edu/courses/csci1510/2013_lectures.html)

**LIST OF PRACTICALS**


| Sr. No. | Title                                                          | Learning Outcomes |
|---------|----------------------------------------------------------------|-------------------|
| 1.      | To implement Caesar Cipher Encryption - Decryption.            | CO1               |
| 2.      | To implement Mono-alphabetic Cipher Encryption – Decryption.   | CO1               |
| 3.      | To implement Hill Cipher Encryption                            | CO1               |
| 4.      | To implement Poly-alphabetic Cipher (Vigener Cipher) Technique | CO1               |

|     |                                                                                      |     |
|-----|--------------------------------------------------------------------------------------|-----|
| 5.  | To implement Play-Fair Cipher Technique.                                             | CO1 |
| 6.  | Write a program to implement Rail-Fence, Simple columnar Encryption Technique.       | CO1 |
| 7.  | To implement S-DES algorithm for data encryption.                                    | CO2 |
| 8.  | Write a program to implement RSA asymmetric (public key and private key)-Encryption. | CO2 |
| 9.  | Implement Diffi-Hellmen Key exchange Method.                                         | CO2 |
| 10. | Implement a digital signature algorithm.                                             | CO3 |
| 11. | Perform various encryption-decryption techniques with cryptool.                      | CO4 |
| 12. | Study and use the Wireshark for the various network protocols.                       | CO4 |

**Computer Engineering Department, Indus Institute of Engineering & Technology, Indus University**

**Program - B. Tech (Computer Engineering)**

| Sr. No. |        | Name of the subject                     | Credit | Teaching Scheme |      |     |             | Evaluation Scheme |     |           |     |       | Segment         |
|---------|--------|-----------------------------------------|--------|-----------------|------|-----|-------------|-------------------|-----|-----------|-----|-------|-----------------|
|         |        |                                         |        | (per week)      |      |     |             | Theory            |     | Practical |     | Total |                 |
|         |        |                                         |        |                 |      |     |             | CIE               | ESE | CIE       | ESE | Marks |                 |
|         |        |                                         |        | Th.             | Tut. | Pr. | Total (hr.) | Th.               | Th. | Pr.       | Pr. |       |                 |
| 1       | CE0716 | Data Warehouse & Mining                 | 4      | 3               | 0    | 2   | 5           | 60                | 40  | 60        | 40  | 200   | PE              |
|         | CE0718 | Advance Computer Architecture           |        |                 |      |     |             |                   |     |           |     |       |                 |
|         | CE0721 | Advance Operating System                |        |                 |      |     |             |                   |     |           |     |       |                 |
| 2       | CE0717 | Compiler Design                         | 4      | 3               | 1    | 0   | 4           | 60                | 40  | 0         | 0   | 100   | Core            |
| 3       |        | <i>Open Elective 8</i>                  | 3      | 2               | 0    | 2   | 4           | 0                 | 0   | 0         | 0   | 0     | OE              |
|         |        | Cyber Security                          |        |                 |      |     |             |                   |     |           |     |       |                 |
|         |        | Block Chaining                          |        |                 |      |     |             |                   |     |           |     |       |                 |
|         |        | Soft Computing                          |        |                 |      |     |             |                   |     |           |     |       |                 |
|         |        | Embedded System                         |        |                 |      |     |             |                   |     |           |     |       |                 |
| 4       | CE0728 | * Natural Language Processing (4+0+0)   | 4      | 3               | 0    | 2   | 0           | 60                | 40  | 60        | 40  | 200   | PE              |
|         | CE0730 | Human Computer Interface                |        |                 |      |     |             |                   |     |           |     |       |                 |
|         | CE0732 | Computer Vision and Applications        |        |                 |      |     |             |                   |     |           |     |       |                 |
|         | CE0723 | Cloud Computing                         |        |                 |      |     |             |                   |     |           |     |       |                 |
| 5       | CE0727 | Software Group Project-I                | 2      | 0               | 1    | 2   | 3           | 0                 | 0   | 100       | 0   | 0     | PRJ             |
|         |        | <i>Open Elective 9</i>                  | 3      | 0               | 0    | 0   | 3           | 60                | 40  | 0         | 0   | 100   | OE              |
| 6       | CE0726 | Internship Credit /Online courses/ MOOC | 2      | 0               | 0    | 0   | 0           | 0                 | 0   | 100       | 0   | 100   | IC              |
| 7       | IT0501 | Computer Graphics                       |        |                 |      |     |             |                   |     |           |     |       | Extra Credit PE |
|         | IT0701 | Artificial Intelligence                 |        |                 |      |     |             |                   |     |           |     |       |                 |
|         | IT0602 | Big Data Analytics                      |        |                 |      |     |             |                   |     |           |     |       |                 |
|         | CS0602 | Data Preparation & Analysis             |        |                 |      |     |             |                   |     |           |     |       |                 |
|         | CS0501 | Advance Microprocessor                  |        |                 |      |     |             |                   |     |           |     |       |                 |
|         | CS0701 | Machine Learning                        |        |                 |      |     |             |                   |     |           |     |       |                 |
|         | CE0716 | Data Warehouse & Mining                 |        |                 |      |     |             |                   |     |           |     |       |                 |
|         | CE0617 | Theory of Computation                   |        |                 |      |     |             |                   |     |           |     |       |                 |
|         | CE0717 | Compiler Design                         |        |                 |      |     |             |                   |     |           |     |       |                 |
|         | CE0517 | Microprocessing and Interfacing         |        |                 |      |     |             |                   |     |           |     |       |                 |
|         |        | Total                                   | 22     | 11              | 2    | 8   | 19          | 240               | 160 | 320       | 80  | 700   |                 |

|                                                                                                                                          |                 |                  |                |                                                                                                     |                                         |                                                     |                                                        |              |
|------------------------------------------------------------------------------------------------------------------------------------------|-----------------|------------------|----------------|-----------------------------------------------------------------------------------------------------|-----------------------------------------|-----------------------------------------------------|--------------------------------------------------------|--------------|
|  <b>इजानेन प्रकाशते जगत्</b><br><b>INDUS UNIVERSITY</b> |                 |                  |                | <b>INDUS INSTITUTE OF TECHNOLOGY &amp; ENGINEERING</b><br>Constituent Institute of Indus University |                                         |                                                     |                                                        |              |
| <b>Subject: CE0716</b>                                                                                                                   |                 |                  |                |                                                                                                     |                                         |                                                     |                                                        |              |
| <b>Program: B.Tech CE</b>                                                                                                                |                 |                  |                | <b>Subject Code: Data Warehouse &amp; Mining</b>                                                    |                                         |                                                     | <b>Semester: VII</b>                                   |              |
| <b>Teaching Scheme (Hours per week)</b>                                                                                                  |                 |                  |                | <b>Examination Evaluation Scheme (Marks)</b>                                                        |                                         |                                                     |                                                        |              |
| <b>Lecture</b>                                                                                                                           | <b>Tutorial</b> | <b>Practical</b> | <b>Credits</b> | <b>University Theory Examination</b>                                                                | <b>University Practical Examination</b> | <b>Continuous Internal Evaluation (CIE)- Theory</b> | <b>Continuous Internal Evaluation (CIE)- Practical</b> | <b>Total</b> |
| <b>3</b>                                                                                                                                 | <b>0</b>        | <b>2</b>         | <b>4</b>       | <b>40</b>                                                                                           | <b>40</b>                               | <b>60</b>                                           | <b>60</b>                                              | <b>200</b>   |

### Course Objectives:

1. To learn how to gather and analyze large sets of data to gain useful business understanding and how to produce a quantitative analysis report/memo with the necessary information to make decisions.
2. To develop and apply critical thinking, problem-solving, and decision-making skills. Define knowledge discovery and data mining for skill development.
3. To recognize the key areas and issues in data mining.
4. To apply the techniques of clustering, classification, association finding, feature selection and visualization to real world data for employability.
5. To determine whether a real-world problem has a data mining solution.
6. To apply evaluation metrics to select data mining techniques.

## CONTENTS

### UNIT-I

#### Introduction to Data Mining

[10 hours]

Importance of Data Mining, Data Mining functionalities, Classification of Data mining systems, Data mining architecture, Major Issues in Data Mining, Applications of Data Mining, Social Impacts of data mining.



## **Introduction to Data Warehouse and OLAP Technology for Data Mining**

Data Warehouse, From Data Warehousing to Data Mining, OLAP versus OLTP, Data Warehouse Architecture, Data Warehouse Development Approach, Multidimensional data Model, Data Warehouse Design Schema

### **UNIT-II**

#### **Data Pre-processing**

**[10 hours]**

Data cleaning: Filling Out Missing Values, Noisy Data Removal, Outlier Analysis, Data Cleaning as a Process; Data Integration: Correlation Techniques, Entity Identification Problem, Tuple Duplication Problem; Data Reduction: Principal Component Analysis, Sampling, Attribute Subset Selection, Histograms; Data Transformation: Normalization, Concept Hierarchy Generation, Aggregation and Discretization

### **UNIT-III**

#### **Mining Frequent Patterns, Associations, Correlations**

**[12 hours]**

Market Basket Analysis, Association Rule Mining, Association Rule Mining Algorithms: Apriori Algorithm, FP Growth Algorithm; Mining of: Single dimensional Association Rules, Multilevel Association Rules, Multidimensional Association Rules and Constraint based Association Rules

#### **Classification and Prediction**

Classification as a Process, Bayesian Classification, Classification by Decision Tree Induction, Associative Classification, Classification by Backpropagation, Prediction: Fundamentals of Prediction, Linear Regression and Non-Linear Regression; Issues in Classification and Prediction

### **UNIT-IV**

#### **Cluster Analysis**

**[12 hours]**

Clustering as a Process, Clustering using Partitioning Methods, Hierarchical methods, Density based Methods, Grid based Methods and Model based Methods

#### **Mining complex Types of Data**

Introduction to Spatial Data Mining, Multimedia Data Mining, Temporal Data Mining, Text and Web Mining

## **Course Outcomes:**

At the end of this subject, students should be able to:

1. Understand various Data Mining Applications in Real World Scenario
2. Identify the Analytical Characteristics of Mining Techniques like Clustering, Classification, Outlier Analysis etc.
3. Employ algorithm to model Engineering Problems
4. Apply Mining concepts into Business Intelligence for giving solutions, organizational changes, products, technologies and methods to organize key data to improve performance and profit.
5. To learn about various clustering techniques.
6. To learn about pattern search and association rules.

## **Text Books:**

1. Data Mining concepts and Techniques by Jiawei Han, Micheline Kamber –Elsevier.

## **Reference Books:**

1. Data Mining by Arun K. Pujari – University Press.
2. Modern Data Warehousing, Data Mining and Visualization by George M. Marakas – Pearson.
3. Data Mining by Vikram Puri and P.Radha Krishana –Oxfrod Press.
4. Data Warehousing by Reema Theraja –Oxford Press

## **Web Resources**

1. NPTEL Lecture: <https://nptel.ac.in/courses/110106064/>
2. NPTEL Lecture: <https://nptel.ac.in/courses/106101007/>

## **LIST OF EXPERIMENTS**

| <b>No.</b> | <b>Title</b>                          | <b>Learning Outcomes</b>                                                                                                                                                                             |
|------------|---------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1          | Study Practical: Introduction to Weka | To learn how to gather and analyze large sets of data to gain useful business understanding and how to produce a quantitative analysis report/memo with the necessary information to make Decisions. |

|    |                                                                                                     |                                                                                                                                                                                                      |
|----|-----------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2  | Study Practical: Introduction to RStudio                                                            | To learn how to gather and analyze large sets of data to gain useful business understanding and how to produce a quantitative analysis report/memo with the necessary information to make Decisions. |
| 3  | To perform Classification using Naïve Bayes Classifier over Iris Dataset in Weka                    | To apply the techniques of clustering, classification, association finding, feature selection and visualization to real world data                                                                   |
| 4  | To perform Clustering using K-Means Algorithm over Iris Dataset in Weka                             | To apply the techniques of clustering, classification, association finding, feature selection and visualization to real world data                                                                   |
| 5  | To Perform Frequent Pattern Mining using Apriori Algorithm over Weather. Nominal Dataset in Weka    | To apply the techniques of clustering, classification, association finding, feature selection and visualization to real world data                                                                   |
| 6  | To Perform Outlier Analysis using Boxplot in RStudio                                                | To apply the techniques of clustering, classification, association finding, feature selection and visualization to real world data                                                                   |
| 7  | To Perform Data Cleaning (Filling out missing values) using Measures of Central Tendency in RStudio | To apply the techniques of clustering, classification, association finding, feature selection and visualization to real world data                                                                   |
| 8  | To Perform Association Rule Mining using Apriori Algorithm over Iris Dataset in RStudio             | To apply the techniques of clustering, classification, association finding, feature selection and visualization to real world data                                                                   |
| 9  | To perform Classification using Naïve Bayes Classifier over Iris Dataset in RStudio                 | To apply the techniques of clustering, classification, association finding, feature selection and visualization to real world data                                                                   |
| 10 | To perform Linear Regression in RStudio                                                             | To apply the techniques of clustering, classification, association finding, feature selection and visualization to real world data                                                                   |

|    |                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|----|----------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 11 | To perform Clustering using K-Means Algorithm over Iris Dataset in RStudio | To apply the techniques of clustering, classification, association finding, feature selection and visualization to real world data                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 12 | Project                                                                    | To learn how to gather and analyze large sets of data to gain useful business understanding and how to produce a quantitative analysis report/memo with the necessary information to make Decisions, To develop and apply critical thinking, problem-solving, and decision-making skills. Define knowledge discovery and data mining, To recognize the key areas and issues in data mining, To apply the techniques of clustering, classification, association finding, feature selection and visualization to real world data, To determine whether a real world problem has a data mining solution, To apply evaluation metrics to select data mining techniques |

**Subject: Compiler Design**

**Program: B. Tech CE**

**Subject Code: CE0717**

**Semester: VII**

| Teaching Scheme (Hours per week) |          |           |         | Examination Evaluation Scheme (Marks) |                                  |                                              |                                                 |       |
|----------------------------------|----------|-----------|---------|---------------------------------------|----------------------------------|----------------------------------------------|-------------------------------------------------|-------|
| Lecture                          | Tutorial | Practical | Credits | University Theory Examination         | University Practical Examination | Continuous Internal Evaluation (CIE)- Theory | Continuous Internal Evaluation (CIE)- Practical | Total |
| 3                                | 0        | 0         | 3       | 40                                    | 0                                | 60                                           | 0                                               | 100   |

### Course Objectives:

1. To provide a thorough understanding of the internals of Compiler Design.
2. To provide the knowledge of the concepts and different phases of compilation with compile time error handling.
3. To provide the knowledge about design of lexical analyzer, top down and bottom up parsers.
4. To provide the knowledge about optimization techniques to intermediate code and generate machine code for high level language program.

## CONTENTS

### UNIT-I

**[12 hours]**

**Overview of the Translation Process:** A Simple Compiler, Difference between interpreter, assembler and compiler. Overview and use of linker and loader, types of Compiler, Analysis of the Source Program, The Phases of a Compiler, Cousins of the Compiler, The Grouping of Phases, Lexical Analysis, Hard coding and Automatic Generation Lexical Analyzers, Front-end and Back-end of compiler, pass structure.

**Lexical Analyzer:** Introduction to Lexical Analyzer, Input Buffering, Specification of Tokens, Recognition of Tokens, A Language for Specifying Lexical Analyzers, Finite Automata From a Regular Expression, Design of a Lexical Analyzer Generator, Optimization of DFA .

## UNIT-II

[12 hours]

**Parsing Theory:** Top Down and Bottom up Parsing Algorithms, Top-Down Parsing, Bottom-Up Parsing, Operator-Precedence Parsing, LR Parsers, Using Ambiguous Grammars, Parser Generators, Automatic Generation of Parsers. Syntax Directed Definitions, Construction of Syntax Trees, Bottom-Up Evaluation of S Attributed Definitions, L-Attributed Definitions, syntax directed definitions and translation schemes

**Error Recovery:** Error Detection & Recovery, Ad-Hoc and Systematic Methods

## UNIT-III

[12 hours]

**Intermediate Code Generation:** Different Intermediate Forms, Syntax Directed Translation Mechanisms and Attributed Mechanisms And Attributed Definition

**Run Time Memory Management:** Source Language Issues, Storage Organization, Storage-Allocation Strategies, and Access to Non local Names, Parameter Passing, Symbol Tables, and Language Facilities for Dynamic Storage Allocation, Dynamic Storage Allocation Techniques

## UNIT-IV

[12 hours]

Code Optimization Global Data Flow Analysis, A Few Selected Optimizations like Command Sub Expression Removal, Loop Invariant Code Motion, Strength Reduction etc Structures and Unions: Code Generation Issues in the Design of a Code Generator, The Target Machine, Run-Time Storage Management, Basic Blocks and Flow Graphs, Next Use Information, A Simple Code Generator, Register Allocation and Assignment, The DAG Representation of Basic Blocks, Peephole Optimization, Generating Code from DAGs, Dynamic Programming Code-Generation Algorithm, Code-Generator Generators.

### Course Outcomes:

At the end of this subject, students should be able to:

1. Explain the concepts and different phases of compilation with compile time error handling.
2. Represent language tokens using regular expressions, context free grammar and finite automata and design lexical analyzer for a language.
3. Compare top down with bottom up parsers, and develop appropriate parser to produce parse tree representation of the input.

4. Generate intermediate code for statements in high level language.
5. Design syntax directed translation schemes for a given context free grammar.
6. Apply optimization techniques to intermediate code and generate machine code for high level language program.

**Text Books:**

1. “System Programming and Operating System” By D M Dhamdhare, Tata McGraw Hill.
2. Compiler Design by Alfred V. Aho, Ravi Sethi, Jeffery D. Ullman, Pearson Publication

**Reference Books:**

1. “System Programming” by Donovan, Tata McGraw Hill
2. “Compilers -Principles and Practice” by Parag H. Dave and Himanshu B. Dave, Pearson Education

**Web Resources:**

1. [www.cse.iitd.ernet.in/~sak/courses/cdp/slides.pdf](http://www.cse.iitd.ernet.in/~sak/courses/cdp/slides.pdf)  
<http://iitmweb.iitm.ac.in/phase2/downloads/106108113/>
2. <http://nptel.ac.in/courses/106108052/>
3. [www.coursera.org/course/compilers](http://www.coursera.org/course/compilers)
4. [www.wikipedia.org/wiki/Compiler](http://www.wikipedia.org/wiki/Compiler)
5. [https://en.wikipedia.org/wiki/Principles\\_of\\_Compiler\\_Design](https://en.wikipedia.org/wiki/Principles_of_Compiler_Design)
6. [https://en.wikipedia.org/wiki/Compiler\\_construction](https://en.wikipedia.org/wiki/Compiler_construction)



**INDUS INSTITUTE OF TECHNOLOGY & ENGINEERING**  
Constituent Institute of Indus University

**Subject: Advanced Computer Architecture**

**Program: B. Tech CE/CSE/IT**

**Subject Code: CE0718**

**Semester: VII**

**Teaching Scheme (Hours per week)**

**Examination Evaluation Scheme (Marks)**

| Lecture | Tutorial | Practical | Credits | University Theory Examination | University Practical Examination | Continuous Internal Evaluation (CIE)- Theory | Continuous Internal Evaluation (CIE)- Practical | Total |
|---------|----------|-----------|---------|-------------------------------|----------------------------------|----------------------------------------------|-------------------------------------------------|-------|
| 3       | 0        | 2         | 4       | 40                            | 40                               | 60                                           | 60                                              | 200   |

### **Course Outcome:**

1. Understand the micro-architectural design of processors.
2. Learn about the various techniques used to obtain performance improvement and power savings in current processors.
3. Understanding about the architecture of advanced processors and memory will improve their skills and knowledge into the hardware side of the computers.

## **CONTENTS**

### **UNIT-I**

**[12 hours]**

#### **INSTRUCTION LEVEL PARALLELISM**

Overview of the current state of computer architecture and computer architecture trends, Measuring, reporting and summarizing Performance; Quantitative Principles of computer design, overview of pipelined architecture. Performance evaluation of pipelined architecture. Limitations of scalar pipelines, ILP concepts Compiler Techniques for Exposing ILP – Dynamic Branch Prediction – Dynamic Scheduling – Multiple instruction Issue – Hardware Based Speculation – Static scheduling - Multi-threading - Limitations of ILP



## **UNIT-II**

**[12 hours]**

### **THREAD LEVEL PARALLELISM**

Symmetric and Distributed Shared Memory Architectures – Performance Issues – Synchronization – Models of Memory Consistency – Case studies: Intel i7 Processor, SMT & CMP Processors

## **UNIT-III**

**[12 hours]**

### **DATA-LEVEL PARALLELISM**

Vector architecture – SIMD extensions – Graphics Processing units – Loop level parallelism.

## **UNIT-IV**

**[12 hours]**

### **MEMORY AND I/O**

Cache memory, virtual memory, Cache Performance – Reducing Cache Miss Penalty and Miss Rate – Reducing Hit Time – Main Memory and Performance – Memory Technology. Types of Storage Devices – Buses – RAID – Reliability, Availability and Dependability – I/O Performance Measures.

### **Course Outcomes**

At the end of this subject, students should be able to:

1. Evaluate performance of different architectures with respect to various parameters
2. Analyze performance of different ILP techniques
3. Understand thread level and data level parallelism.
4. Understand about advanced level processors
5. Identify cache and memory related issues in multi-processors
6. Understand about type of storage devices

**Text Books:**

1. John L Hennessey and David A Patterson, "Computer Architecture A Quantitative Approach", Morgan Kaufmann/ Elsevier, Fifth Edition, 2012

**Reference Books:**

1. Kai Hwang and Faye Briggs, "Computer Architecture and Parallel Processing", Mc Graw-Hill International Edition, 2000.
2. Sima D, Fountain T and Kacsuk P, "Advanced Computer Architectures: A Design Space Approach", Addison Wesley, 2000.

**Web Resources**

1. <https://nptel.ac.in/courses/106105033/1>

**LIST OF EXPERIMENTS**

| <b>Experi<br/>ment.<br/>No.</b> | <b>Title</b>                                                                                                             | <b>Learning Outcomes</b>                                                      |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|
| 1                               | Write the working of 8085 simulator GNUsim8085 and basic architecture of 8085 along with small introduction.             | Students will get know basic computer architecture.                           |
| 2                               | Study the complete instruction set of 8085 and write the instructions in the instruction set of 8085 along with examples | Students will get hands on practice about instruction execution.              |
| 3                               | Write an assembly language code in GNUsim8085 to implement data transfer instruction                                     | Students will get hands on practice about data transfer.                      |
| 4                               | Write an assembly language code in GNUsim8085 to implement arithmetic instruction                                        | Students will get hands on practice about arithmetic instruction              |
| 5                               | Write a assembly language code for simple instruction pipeline implementation                                            | Students will get hands on practice about instruction pipeline implementation |
| 6                               | Write a assembly language code for simple Arithmetic pipeline implementation                                             | Students will get hands on practice about Arithmetic pipeline implementation  |

|    |                                                                     |                                                                       |
|----|---------------------------------------------------------------------|-----------------------------------------------------------------------|
| 7. | Evaluate the performance of intel I7 Processor                      | Students will get to know about intel i7 processor                    |
| 8  | Write assembly language code for simulation of vector architecture. | Students will get hands on practice about vector architecture.        |
| 9. | Simulate the performance of various memory organization             | Students will get to know about performance of various memory device. |

**Subject: Natural Language Processing**

**Program: B. Tech CE/CS/IT**

**Subject Code: CE0728**

**Semester: VII**

**Teaching Scheme (Hours per week)**

**Examination Evaluation Scheme (Marks)**

| Lecture | Tutorial | Practical | Credits | University Theory Examination | University Practical Examination | Continuous Internal Evaluation (CIE)- Theory | Continuous Internal Evaluation (CIE)- Practical | Total |
|---------|----------|-----------|---------|-------------------------------|----------------------------------|----------------------------------------------|-------------------------------------------------|-------|
| 3       | 0        | 2         | 4       | 40                            | 40                               | 60                                           | 60                                              | 200   |

### **Course Objectives:**

1. To identify linear and non-linear text classification.
2. Learn about the various language models.
3. Discuss sequence labeling and its various applications
4. Identify various applications for natural language processing.

## **CONTENTS**

### **UNIT-I**

**[12 hours]**

**Introduction:** What is NLP, Why NLP is Difficult, History of NLP, Advantages of NLP, Disadvantages of NLP, Components of NLP, Applications of NLP, Knowledge in speech and language processing, Ambiguity, Models and algorithms, Language, Thought, and Understanding, State-of-the-art, History

### **UNIT-II**

**[12 hours]**

**Language Modeling and Part of Speech Tagging:** Unigram Language Model, Bigram, Trigram, N-gram, Advanced smoothing for language modeling, Empirical Comparison of Smoothing Techniques, Applications of Language Modeling, Natural Language Generation, Parts of Speech Tagging, Morphology, Named Entity Recognition

**Words and word forms:** Regular expressions and automata, Morphology and Finite-State Transducers, Computational Phonology and Text-to-Speech, Probabilistic Models of Pronunciation and Spelling, HMMs and Speech Recognition

### **UNIT-III**

**[12 hours]**

**Syntax:** Word classes and Part-of-speech tagging, Context-free grammars for English, Parsing with context-free grammars, Features and unification, Lexicalized and probabilistic parsing

**Semantics:** Representing meaning, Semantic analysis, Lexical semantics, Word Sense Disambiguation and NLP in Information Retrieval

### **UNIT-IV**

**[12 hours]**

**Pragmatics:** Discourse, Dialogue and Conversational Agents, Generation, Machine Translation

**Natural Language Processing:** Application of Deep learning in NLP, Text classification, Word generation

### **Course Outcomes:**

At the end of this subject, students should be able to:

1. Comprehend the key concepts of NLP which are used to describe and analysis language
2. Perform POS tagging and generate context free grammar for English language
3. Realize semantics and pragmatics of English language for processing
4. Formulate the parser for context-free grammars.
5. Understand the applications for real-life problems of natural language processing.
6. Understand and use of natural language processing tasks.

### **Text Books:**


1. Speech and Language processing an introduction to Natural Language Processing, Computational Linguistics and speech Recognition by Daniel Jurafsky and James H. Martin (ISBN13: 978-0131873216)
2. James A. Natural language Understanding 2e, Pearson Education, 1994.

**Reference Books:**

1. Handbook of Natural Language Processing, Second Edition-NitinIndurkha, Fred J. Damerau, Fred J. Damerau (ISBN13: 978-1420085921)
2. Bharati A., Sangal R., Chaitanya V. Natural language processing: a Paninian perspective, PHI, 2000.
3. Siddiqui T., Tiwary U. S. Natural language processing and Information retrieval, OUP, 2008.

**Web Resources:**

1. <https://github.com/keon/awesome-nlp>
2. <https://nlp.stanford.edu/blog/>
3. <https://courses.analyticsvidhya.com/courses/Intro-to-NLP>

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|------------------------------------------------------------------------------------------------------------------------------------|----------|-----------|---------|-----------------------------------------------------------------------------------------------------|----------------------------------|----------------------------------------------|-------------------------------------------------|-------|
| <b>Subject: Soft Computing</b>                                                                                                     |          |           |         |                                                                                                     |                                  |                                              |                                                 |       |
| <b>Program: B. Tech CE/CSE/IT</b>                                                                                                  |          |           |         | <b>Subject Code: CE0719</b>                                                                         |                                  |                                              | <b>Semester: VII</b>                            |       |
| <b>Teaching Scheme (Hours per week)</b>                                                                                            |          |           |         | <b>Examination Evaluation Scheme (Marks)</b>                                                        |                                  |                                              |                                                 |       |
| Lecture                                                                                                                            | Tutorial | Practical | Credits | University Theory Examination                                                                       | University Practical Examination | Continuous Internal Evaluation (CIE)- Theory | Continuous Internal Evaluation (CIE)- Practical | Total |
| 3                                                                                                                                  | 0        | 2         | 4       | 40                                                                                                  | 40                               | 60                                           | 60                                              | 200   |

### Course Objectives:

1. Soft computing refers to principal components like fuzzy logic, neural networks and genetic algorithm, which have their roots in Artificial Intelligence.
2. Healthy integrations of all these techniques have resulted in extending the capabilities of the technologies to more effective and efficient problem-solving methodologies
3. To know basic idea of modern engineering techniques which are useful for solving non-linear and complex functions that may come across dissertation/research work which further helps in employability and entrepreneurship.
4. To solve various optimization problems and to implement algorithms based on soft computing.
5. To understand different soft computing techniques like Genetic Algorithms, Fuzzy Logic, Neural Networks and their combination.
6. To apply soft computing techniques to solve engineering or real-life problems for skill development.

## CONTENTS

### UNIT-I

**[12 hours]**

Introduction to Neural Network: Biological Neuron, Fundamental concept of Artificial Neural Network & Biological Neural Network, Evolution of Neural Networks, Basic Models of Artificial Neural Networks, Types of Learning, Important Terminologies of ANNs, Idea of computational units & Activation Functions, McCulloch–Pitts unit and Thresholding logic, Linear separability, Hebb network

## **UNIT-II**

**[12 hours]**

Supervised Learning Networks: Perceptron, Perceptron Learning Algorithm, Convergence theorem for Perceptron Learning Algorithm, Adaline ,Multiple Adaptive Linear Neurons , Multi-layered Networks, Generalized delta rule, Gradient Descent, Backpropagation Network, Radial basis function network, Adaptive Learning rate, Feedback Networks, Back-propagation through time, real-time recurrent learning

Unsupervised Learning Networks: Competitive Learning, Fixed weight Competitive Nets, Kohonen Self-organizing Feature Maps, Extended Kohonen SOM.

## **UNIT-III**

**[12 hours]**

Fuzzy Logic: Basic concepts of fuzzy logic, Fuzzy sets and Crisp sets, Fuzzy set theory and operations, Properties of fuzzy sets, Fuzzy and Crisp relations, Fuzzy to Crisp conversion. Fuzzy Logic –II (Fuzzy Membership, Rules) Membership functions, interference in fuzzy logic, fuzzy if-then rules, Fuzzy implications and Fuzzy algorithms, Fuzzyfication & Defuzzification, Fuzzy Controller, Industrial applications

## **UNIT-IV**

**[12 hours]**

Genetic Algorithm(GA) :Basic concepts, working principle, procedures of GA, flow chart of GA, Genetic representations, (encoding) Initialization and selection, Selection techniques, Crossover Techniques, ,Genetic operators, Mutation, Mutation techniques ,Problem Solving using GA, applications.

### **Course Outcomes:**

At the end of this subject, students should be able to:

1. Identify and describe soft computing techniques and their roles in building intelligent machines.
2. Recognize the feasibility of applying a soft computing methodology for a particular problem.
3. Apply fuzzy logic and reasoning to handle uncertainty and solve engineering problems.
4. Apply genetic algorithms to combinatorial optimization problems.



5. Apply neural networks to pattern classification and regression problems.
6. Effectively use existing software tools to solve real problems using a soft computing approach.

### Text Books:

1. S.N. Sivanandan and S.N. Deepa, Principles of Soft Computing, Wiley India, 2007. ISBN: 10: 81-265-1075-7.
2. S. Rajsekaran & G.A. Vijayalakshmi Pai, "Neural Networks, Fuzzy Logic and Genetic Algorithm: Synthesis and Applications" Prentice Hall of India.

### Reference Books:

1. Simon Haykin, "Neural Networks", Prentice Hall of India
2. Timothy J. Ross, "Fuzzy Logic with Engineering Applications" Wiley India.
3. Kumar Satish, "Neural Networks" Tata Mc Graw Hill


### Web Resources

1. <https://www.youtube.com/watch?v=aYf3MKzExzI>
2. <https://www.youtube.com/watch?v=0kgEjAAjxM8>
3. <https://www.youtube.com/watch?v=HfdZE1dogfA>
4. [https://www.youtube.com/watch?v=Z\\_8MpZeMdd4](https://www.youtube.com/watch?v=Z_8MpZeMdd4)

### LIST OF EXPERIMENTS

| Experiment No. | Title                                                                                                                         | Learning Outcomes                                 |
|----------------|-------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|
| 1              | W.A.P to implement simple AND & OR function with neuron.(take $w_1=w_2=1$ , find appropriate threshold(threshold))            | Basic knowledge of neuron model.                  |
| 2              | Write a program to generate XOR function using McCulloch-Pitts neuron and appropriate values for weights, bias and threshold. | Basic knowledge of neuron model.                  |
| 3              | Write a program for perceptron net for an AND function with bipolar inputs and targets.                                       | Basic knowledge of perceptron learning algorithm. |

|           |                                                                                                                       |                                                                     |
|-----------|-----------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|
| <b>4</b>  | Write a program to Implement Hebb Algorithm.                                                                          | Basic knowledge of hebb algorithm in In neural network.             |
| <b>5</b>  | Write a program to Implement ADALINE Algorithm.                                                                       | Basic knowledge of ADALINE algorithm in In neural network.          |
| <b>6</b>  | Write a program to Implement MADALINE Algorithm.                                                                      | Basic knowledge of MADALINE algorithm in In neural network.         |
| <b>7</b>  | Write a program to Implement BPN(Back Propagation Network) Algorithm.                                                 | Basic knowledge of back propogation algorithm in In neural network. |
| <b>8</b>  | W.A.P to implement fuzzy set properties & operations.                                                                 | Basic knowledge of fuzzy logic.                                     |
| <b>9</b>  | Solve a given problem-1(Operatons) using Fuzzy Logic in MATLAB.                                                       | Basic knowledge of fuzzy logic.                                     |
| <b>10</b> | Solve a given problem (Max-Min Composition) using Fuzzy Logic in MATLAB.                                              | Basic knowledge of fuzzy logic.                                     |
| <b>11</b> | Solve a given problem using fuzzy inference in MATLB GUI                                                              | Basic knowledge of fuzzy logic.                                     |
| <b>12</b> | W.A.P to maximize the function $f(x) = x^2$ using Genetic algorithm, where x ranges from (0-31),perform 5 iterations. | Basic knowledge of Genetic Algorithm.                               |
| <b>13</b> | W.A.P to find the minimum of the quadratic equation $f(x)=x^2+5x+2$ , within the range $-6 \leq x \leq 0$             | Basic knowledge of Genetic Algorithm.                               |
| <b>14</b> | Study GA tool in MATLAB.                                                                                              | Basic knowledge of Genetic Algorithm.                               |
| <b>15</b> | Study Neural Network tool in MATLAB.                                                                                  | Basic knowledge of neuron network.                                  |

|                                                                                                                                    |                 |                  |                |                                                                                                     |                                         |                                                     |                                                        |              |
|------------------------------------------------------------------------------------------------------------------------------------|-----------------|------------------|----------------|-----------------------------------------------------------------------------------------------------|-----------------------------------------|-----------------------------------------------------|--------------------------------------------------------|--------------|
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| <b>Subject: Embedded System</b>                                                                                                    |                 |                  |                |                                                                                                     |                                         |                                                     |                                                        |              |
| <b>Program: B. Tech CE/CSE/IT</b>                                                                                                  |                 |                  |                | <b>Subject Code: CE0731</b>                                                                         |                                         |                                                     | <b>Semester: VII</b>                                   |              |
| <b>Teaching Scheme (Hours per week)</b>                                                                                            |                 |                  |                | <b>Examination Evaluation Scheme (Marks)</b>                                                        |                                         |                                                     |                                                        |              |
| <b>Lecture</b>                                                                                                                     | <b>Tutorial</b> | <b>Practical</b> | <b>Credits</b> | <b>University Theory Examination</b>                                                                | <b>University Practical Examination</b> | <b>Continuous Internal Evaluation (CIE)- Theory</b> | <b>Continuous Internal Evaluation (CIE)- Practical</b> | <b>Total</b> |
| <b>3</b>                                                                                                                           | <b>0</b>        | <b>2</b>         | <b>4</b>       | <b>40</b>                                                                                           | <b>40</b>                               | <b>60</b>                                           | <b>60</b>                                              | <b>200</b>   |

### Course Objective:

To impart knowledge on

1. 8051 Microcontroller based system design.
2. Microchip PIC 8 bit microcontroller based system design

## CONTENTS

### UNIT-I

[12 Hours]

#### **Background and Motivation-INTRODUCTION TO EMBEDDED SYSTEMS**

Introduction to an embedded systems design & RTOS: Introduction to Embedded system, Processor in the System, Microcontroller, Memory Devices, Embedded System Project Management, ESD and Co-design issues in System development Process, Design cycle in the development phase for an embedded system, Use of target system or its emulator and In-circuit emulator, Use of software tools for development of an ES. Inter-process Communication and Synchronization of Processes, Tasks and Threads, Problem of Sharing Data by Multiple Tasks, Real Time Operating Systems: OS Services, I/O Subsystems, Interrupt Routines in RTOS Environment, RTOS Task Scheduling model, Interrupt Latency and Response times of the tasks.

## UNIT-2

[12 Hours]

**Overview of Microcontroller:** Microcontroller and Embedded Processors, Overview of 8051 Microcontroller family: Architecture, basic assembly language programming concepts, The program Counter and ROM Spaces in the 8051, Data types, 8051 Flag Bits and PSW Register, 8051 Register Banks and Stack Instruction set, Loop and Jump Instructions, Call Instructions, Time delay generations and calculations, I/O port programming Addressing Modes, accessing memory using various addressing modes, Arithmetic instructions and programs, Logical instructions, BCD and ASCII application programs, Single-bit instruction programming, Reading input pins vs. port Latch, Programming of 8051 Timers, Counter Programming

## UNIT-3

[12 Hours]

**Communication with 8051:** Basics of Communication, Overview of RS-232, I2C Bus, UART, USB, 8051 connections to RS-232, 8051 serial communication programming, 8051 interrupts, Programming of timer interrupts, Programming of External hardware interrupts, Programming of the serial communication interrupts, Interrupt priority in the 8051

## UNIT-4

[12 Hours]

**Interfacing with 8051:** Interfacing an LCD to the 8051, 8051 interfacing to ADC, Sensors, Interfacing a Stepper Motor, 8051 interfacing to the keyboard, Interfacing a DAC to the 8051, 8255 Interfacing with 8031/51, 8051/31 interfacing to external memory

### **Course Outcomes:**


1. Explain various embedded system applications and design requirements
2. Construct embedded system hardware
3. Develop software programs to control embedded system

### **Text Book:**

1. Raj Kamal, "Embedded Systems", TMH, 2004.
2. M.A. Mazidi and J. G. Mazidi, "The 8051 Microcontroller and Embedded Systems", PHI, 2004.

**Reference Book:**

1. David E. Simon, "An Embedded Software Primer", Pearson Education, 1999.
2. K.J. Ayala, "The 8051 Microcontroller", Penram International, 1991.
3. Dr. Rajiv Kapadia, "8051 Microcontroller & Embedded Systems", Jaico Press
4. Shibu K V "Introduction to Embedded Systems", TMH, 2011.
5. Dr. Prasad, "Embedded Real Time System", Wiley Dreamtech, 2004.

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|-----------------------------------------------------------------------------------------------------------------------------------|----------|-----------|---------|-----------------------------------------------------------------------------------------------------|----------------------------------|----------------------------------------------|-------------------------------------------------|-------|
| <b>Subject: Human Computer Interface</b>                                                                                          |          |           |         |                                                                                                     |                                  |                                              |                                                 |       |
| <b>Program: B. Tech CE</b>                                                                                                        |          |           |         | <b>Subject Code: CE0730</b>                                                                         |                                  |                                              | <b>Semester: VII</b>                            |       |
| <b>Teaching Scheme (Hours per week)</b>                                                                                           |          |           |         | <b>Examination Evaluation Scheme (Marks)</b>                                                        |                                  |                                              |                                                 |       |
| Lecture                                                                                                                           | Tutorial | Practical | Credits | University Theory Examination                                                                       | University Practical Examination | Continuous Internal Evaluation (CIE)- Theory | Continuous Internal Evaluation (CIE)- Practical | Total |
| 3                                                                                                                                 | 0        | 2         | 4       | 40                                                                                                  | 40                               | 60                                           | 60                                              | 200   |

### Course Objectives:

1. To learn the basic physiological, perceptual, and cognitive components of human learning and memory.
2. To gain theoretical knowledge of and practical experience in the fundamental aspects of designing and implementing user interfaces.
3. To analyze interaction problems from a technical, cognitive, and functional perspective for employability and entrepreneurship.
4. To develop an awareness of the range of general human-computer interaction issues that must be considered when designing information systems.
5. To learn about multimodal displays for conveying and presenting information.
6. To design and evaluate the quality of user interfaces and spatial displays for user skill development

## CONTENTS

### UNIT-I

**[12 hours]**

#### Introduction:

The human, The computer, The interaction, Paradigms, Usability of Interactive Systems, Guidelines, Principles, and Theories  
 Design Process- Interaction design basics, HCI in the software process, Design rules, Implementation support, Evaluation techniques, Universal design and User support.

## UNIT-II

[12 hours]

### **Models and Theories:**

Cognitive models, Socio-organizational issues and stakeholder requirements, Communication and collaboration models, Task analysis, Dialogue notations and design, Models of the system, Modeling rich interaction.

## UNIT-III

[12 hours]

### **Interaction Styles:**

Direct Manipulation and Virtual Environments, Menu Selection, Form Filling and Dialog Boxes, Command and Natural Languages, Interaction Devices, Collaboration and Social Media Participation.

## UNIT-IV

[12 hours]

### **Design Issues:**

Quality of Service, Balancing Function and Fashion, User Documentation and Online Help, Information Search and Information Visualization.

### **Outside the Box:**

Group ware, Ubiquitous computing and augmented realities, Hypertext, multimedia, and the world wide web (www).

### **Course Outcomes:**

At the end of this subject, students should be able to:

1. Students will learn the basic physiological, perceptual, and cognitive components of human learning and memory.
2. Students will gain theoretical knowledge of and practical experience in the fundamental aspects of designing and implementing user interfaces.
3. Students will learn to analyze interaction problems from a technical, cognitive, and functional perspective.
4. Students will develop an awareness of the range of general human-computer interaction issues that must be considered when designing information systems.
5. Students will learn about multimodal displays for conveying and presenting information.
6. Students will know and have practiced a variety of simple methods for designing and evaluating the quality of user interfaces and spatial displays.

**Text Books:**

1. “Human Computer Interaction” by Alan Dix, Janet Finlay, ISBN: 9788131717035, Pearson Education (2004)
2. “Designing the User Interface - Strategies for Effective Human Computer Interaction”, by Ben Shneiderman ISBN: 9788131732557, Pearson Education (2010).

**Reference Books:**

1. Usability Engineering: Scenario-Based Development of Human-Computer Interaction, by Rosson, M. and Carroll, J. (2002)
2. The Essentials of Interaction Design, by Cooper, et al. , Wiley Publishing(2007)
3. Usability Engineering, by Nielsen, J. Morgan Kaufmann, San Francisco, 1993. ISBN 0-12-518406-9
4. The Resonant Interface: HCI Foundations for Interaction Design, by Heim, S. , Addison-Wesley. (2007)

**LIST OF EXPERIMENTS**


| <b>Experi<br/>ment.<br/>No.</b> | <b>Title</b>                                                                                                                                                                                                      | <b>Learning<br/>Outcomes</b>                         |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------|
| 1.1                             | Design an User Interface for<br>a) Welcome screen<br>b) Multiplication and Addition of any two numbers                                                                                                            | To learn about user interface                        |
| 1.2                             | Design an user interface for assigning a grade to students based on the subjects marks<br><br>Design an User interface for printing the numbers in<br>a) Ascending order<br>b) Descending order<br>c) Subtraction | To learn about user interface                        |
| 1.3                             | Design an user interface for calculator<br><br>Design a user interface for registration of a student for admissions.                                                                                              | To learn about user interface with human interaction |



|     |                                                                                                                                                                                                                                                                         |                                                      |
|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------|
| 1.4 | <p>Design an user interface for semester registration</p> <p>Design an user interface for displaying and changing of picture on the form</p> <p>Design an user interface for To count the number of digits in a given number</p>                                        | To learn about user interface with human interaction |
| 1.5 | <p>Design an user interface for simple sort program</p> <p>Design an User interface User interest form, Making suggestion form</p> <p>Design an user interface to check whether the year is leap year or not</p> <p>Design an user interface for menu based Program</p> | To learn about user interface with human interaction |

|     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                             |
|-----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|
| 1.6 | <p>List of Projects</p> <ol style="list-style-type: none"> <li>1) Design an User Interfaces for ATM Machine</li> <li>2) Design an User Interfaces for Socio E-commerce shop</li> <li>3) Design an User Interfaces for Smart Phone</li> <li>4) Design an User Interfaces for Railway Reservation System</li> <li>5) Design an User Interfaces for Online Examination</li> <li>6) Design an User Interfaces for Hospital management</li> <li>7) Design an User Interfaces for library management</li> <li>8) Design an User Interfaces for Hotel Booking</li> <li>9) Design an User Interfaces for Online Banking System</li> <li>10) Design an User Interfaces for On line auction</li> <li>11) Design an User Interfaces for Booking of Movie Tickets</li> <li>12) Design an User Interfaces for University admissions process</li> <li>13) Design an User Interfaces for Online Job Search</li> <li>14) Design an User Interfaces for Tourism system</li> <li>15) Design an User Interfaces for Stock Market</li> <li>16) Design an User Interfaces for Windows 8 on Laptop</li> <li>17) Design an User Interfaces for driver of a modern car</li> <li>18) Design an User Interfaces for flight simulation system</li> <li>19) Design an User Interfaces for Social Network sites</li> <li>20) Design an User Interfaces for Passport Tracking system</li> <li>21) Design an user Interfaces for project management system</li> <li>22) Design an user Interfaces for credit card processing system</li> <li>23) Design an user Interfaces for Bus Reservation System</li> <li>24) Design an user Interfaces for Flight Reservation System</li> <li>25) Design an user Interfaces for Foreign Trading System</li> <li>26) Design an user Interfaces for Super Market Management System</li> <li>27) Design an user Interfaces for Computer Institute Management System</li> <li>28) Design an user Interfaces for Paint Brush application</li> <li>29) Design an user Interfaces for Insurance Management System</li> <li>30) Design an user Interfaces for College Management System</li> <li>31) Design an user Interfaces for Courier Management System</li> </ol> | <p>To learn about user interface with human interaction</p> |
|-----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|



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|------------------------------------------------------------------------------------------------------------------------------------|-----------------|------------------|----------------|-----------------------------------------------------------------------------------------------------|-----------------------------------------|-----------------------------------------------------|--------------------------------------------------------|--------------|
| <b>Subject: Advance Operating System</b>                                                                                           |                 |                  |                |                                                                                                     |                                         |                                                     |                                                        |              |
| <b>Program: B. Tech CE/CSE/IT</b>                                                                                                  |                 |                  |                | <b>Subject Code: CE0721</b>                                                                         |                                         |                                                     | <b>Semester: VII</b>                                   |              |
| <b>Teaching Scheme (Hours per week)</b>                                                                                            |                 |                  |                | <b>Examination Evaluation Scheme (Marks)</b>                                                        |                                         |                                                     |                                                        |              |
| <b>Lecture</b>                                                                                                                     | <b>Tutorial</b> | <b>Practical</b> | <b>Credits</b> | <b>University Theory Examination</b>                                                                | <b>University Practical Examination</b> | <b>Continuous Internal Evaluation (CIE)- Theory</b> | <b>Continuous Internal Evaluation (CIE)- Practical</b> | <b>Total</b> |
| <b>3</b>                                                                                                                           | <b>0</b>        | <b>2</b>         | <b>4</b>       | <b>40</b>                                                                                           | <b>40</b>                               | <b>60</b>                                           | <b>60</b>                                              | <b>200</b>   |

### Course Outcome:

After learning the course the students should be able to

1. Understand general architecture of computers
2. Understand and analyze theory and implementation of: processes, resource control (concurrency etc.), physical and virtual memory, scheduling, I/O and files.
3. Understand and use advanced concepts in operating systems
4. Understand the high-level structure of the Linux kernel both in concept

## CONTENTS

### UNIT-I

[12 hours]

#### **Operating System Introduction, Structures:**

Simple Batch, Multi programmed, time-shared, Personal Computer, Parallel, Distributed Systems, Real-Time Systems, System components, Operating-System services, System Calls, Virtual Machines, System Design and Implementation. Process and CPU Scheduling - Process concepts and scheduling, Operation on processes, Cooperating Processes, Threads, and Interposes Communication Scheduling Criteria, Scheduling Algorithm, Multiple -Processor Scheduling, Real-Time Scheduling.

**Memory Management and Virtual Memory:**

Logical versus Physical Address Space, Swapping, Contiguous Allocation, Paging, Segmentation, Segmentation with Paging. Demand Paging, Performance of Demanding Paging, Page Replacement, Page Replacement Algorithm, Allocation of Frames, Thrashing.

**UNIT-II****[12 hours]****File System Interface and Implementation:**

Access methods, Directory Structure, Protection, File System Structure, Allocation methods, Free-space Management, Directory Management, Directory Implementation, Efficiency and Performance.

**Deadlocks:**

System Model, Dead locks Characterization, Methods for Handling Dead locks Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, and Recovery from Deadlock.

**UNIT-III****[12 hours]****Operating System Security Issues:**

Introduction to the topic of Security in Operating Systems, Principles of Information Security, Access Control Fundamentals, Generalized Security Architectures.

**Introduction to Distributed systems:**

Goals of distributed system, hardware and software Concepts, design issues. Elementary introduction to the terminologies within Modern Oss: Parallel, Distributed, Embedded & Real Time, Mobile, Cloud and Other Operating System Models.

**UNIT-IV****[12 hours]****Clock Synchronization:**

Logical Clocks, Mutual Exclusion, Global Positioning Of Nodes, Data-Centric Consistency Models, Client-Centric Consistency Models, Consistency Protocols.

**Introduction to Fault Tolerance:** Process Resilience, Reliable Client-Server Communication, Reliable Group Communication, Distributed Commit, Recovery, Secure Channels, Access Control, Security Management

## **Course Outcomes:**

At the end of this subject, students should be able to:

1. Understand about general architecture of computers
2. Understand and analyze theory and implementation of: processes, resource control (concurrency etc.).
3. Understand about physical and virtual memory, scheduling, I/O and files.
4. Understand and use advanced concepts in operating systems
5. Understand the high-level structure of the Linux kernel both in concept
6. Understand the about the concept of clock synchronization and fault tolerance.

## **Text Books:**

1. Modern Operating System by Andrew S Tanenbaum PHI Publication
2. OS Principal by Peter B Galvin7th Edition John Willey

## **Reference Books:**

1. Operating System by Dhamdhare TMH Publication
2. Distributed Operating System by Andrew S Tanenbaum PHI Publication

## **Web Resources:**

1. <https://www.dos.org/>
2. <https://www.tutorialpoint.com/os/>

## **LIST OF EXPERIMENTS**

| <b>No.</b> | <b>Title</b>                                                                                                                 | <b>Learning Outcomes</b>                 |
|------------|------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|
| <b>1.1</b> | Uses an exploration of POSIX file I/O to motivate learning about DTrace, user-kernel interactions, and performance analysis. | Basic Knowledge of POSIX Thread Analysis |

|                   |                                                                                                                                                                                                                                                                                                                                                           |                                              |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|
| <p><b>2.1</b></p> | <p>Uses DTrace to understand the dynamics of local Inter Process Communication: kernel memory allocation, copying, locking, scheduling, and message-based IPC. Of particular concern will be building an understanding of basic IPC functionality, but also of how it interacts with buffering and the scheduler to affect IPC latency and throughput</p> | <p>Basic Knowledge of IPC Functionality.</p> |
| <p><b>3.1</b></p> | <p>Introduces a new performance analysis mechanism, hardware performance counters that allow direct monitoring of low level architectural and micro-architectural details of performance. Using this tool, we will revisit existing benchmarks to explain the use of CPU time by the application and kernel.</p>                                          | <p>Basic Knowledge of micro kernel.</p>      |
| <p><b>4.1</b></p> | <p>To explore the TCP state machine in practice: how it is triggered by both API and network-level events. An early measurement of the impacts of network latency on TCP is performed.</p>                                                                                                                                                                | <p>Basic Knowledge of TCP state machine</p>  |
| <p><b>5.1</b></p> | <p>Continues our investigation of the effects of network latency on TCP performance, and especially its interactions with congestion-control slow start and steady state. We also explore how socket buffer configuration affects flow control, and the combined end effects on available bandwidth.</p>                                                  | <p>Basic Knowledge of TCP Latency</p>        |

**Subject: Cyber Security**

**Program: B. Tech CE/CS/IT**

**Subject Code: CE0729**

**Semester: VII**

| Teaching Scheme (Hours per week) |          |           |         | Examination Evaluation Scheme (Marks) |                                  |                                              |                                                 |       |
|----------------------------------|----------|-----------|---------|---------------------------------------|----------------------------------|----------------------------------------------|-------------------------------------------------|-------|
| Lecture                          | Tutorial | Practical | Credits | University Theory Examination         | University Practical Examination | Continuous Internal Evaluation (CIE)- Theory | Continuous Internal Evaluation (CIE)- Practical | Total |
| 3                                | 0        | 2         | 4       | 40                                    | 40                               | 60                                           | 60                                              | 200   |

### **Course Objectives:**

1. To understand cyber-attack, types of cybercrimes, cyber laws and also how to protect them self and ultimately society from such attacks.
2. Generalize the knowledge on Digital Forensics.
3. Understand the legal and social issues at play in developing solutions.
4. Appreciate the vulnerabilities and threats posed by criminals, terrorist and nation states to national infrastructure.
5. To enhance employability skills in the field of Cyber Security and Forensics.

## **CONTENTS**

### **UNIT-I**

**[12 hours]**

#### **Introduction to Cyber Security**

Overview of Cyber Security, Importance and challenges in Cyber Security, Cyberspace, Cyber threats, Cyberwarfare, CIA Triad, Cyber Terrorism, Cyber Security of Critical Infrastructure, Cyber Security - Organizational Implications.



## **UNIT-II**

**[12 hours]**

### **Systems Vulnerability Scanning**

Overview of vulnerability scanning, Open Port / Service Identification, Banner / Version Check, Traffic Probe, Vulnerability Probe, Vulnerability Examples, OpenVAS, Metasploit. Networks Vulnerability Scanning - Nmap, Socat, understanding Port and Services tools - Datapipe, Fpipe, WinRelay, Network Reconnaissance – Nmap, THC-Amap and System tools. Network Sniffers and Injection tools – Tcpdump and Windump, Wireshark, Ettercap, Hping Kismet

## **UNIT-III**

**[12 hours]**

### **Network Defense Tools**

Firewalls and Packet Filters: Firewall Basics, Packet Filter Vs Firewall, How a Firewall Protects a Network, Packet Characteristic to Filter, Stateless Vs Stateful Firewalls, Network Address Translation (NAT) and Port Forwarding, the basic of Virtual Private Networks, Linux Firewall, Windows Firewall, Snort: Introduction Detection System.

### **Web Application Tools**

Scanning for web vulnerabilities tools: Nikto, W3af, HTTP utilities - Curl, OpenSSL and Stunnel, Application Inspection tools – Zed Attack Proxy, Sqlmap. DVWA, Webgoat, Password Cracking and Brute-Force Tools – John the Ripper, L0htcrack, Pwdump, HTC-Hydra

## **UNIT-IV**

**[12 hours]**

### **Cyber Laws and Forensics**

Introduction, Cyber Security Regulations, Roles of International Law, the state and Private Sector in Cyberspace, Cyber Security Standards. The Indian Cyberspace, National Cyber Security Policy 2013.

Introduction to Cyber Forensics, Need of Cyber Forensics, Cyber Evidence, Documentation and Management of Crime Scene, Image Capturing and its importance, Partial Volume Image, Web Attack Investigations, Denial of Service Investigations, Internet Crime Investigations, Internet Forensics, Steps for Investigating Internet Crime, Email Crime Investigations.

## **Course Outcomes:**

At the end of this subject, students should be able to:

1. To understand importance and challenges in Cyber Security.
2. Understand, appreciate, employ, design and implement appropriate security technologies and policies to protect computers and digital information.
3. Identify & Evaluate Information Security threats and vulnerabilities in Information Systems and apply security measures to real time scenarios.
4. To use Network Defense tools and Web Application Tools.
5. Demonstrate the use of standards and cyber laws to enhance information security in the development process and infrastructure protection.
6. To acquire the hands-on skills and the knowledge required for job competency.

## **Text Books:**

- 1) Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives by Nina Godbole and Sunit Belpure, Publication Wiley

## **Reference Books:**

- 1) Anti-Hacker Tool Kit (Indian Edition) by Mike Shema, Publication Mc Graw Hill.
- 2) Charles P. Pfleeger, Shari Lawrance Pfleeger, "Analysing Computer Security", Pearson Education India.
- 3) V.K. Pachghare, "Cryptography and information Security", PHI Learning Private Limited, Delhi India.
- 4) Dr. Surya Prakash Tripathi, Ritendra Goyal, Praveen Kumar Shukla , "Introduction to Information Security and
- 5) Cyber Law" Willey Dreamtech Press. Schou, Shoemaker, "Information Assurance for the Enterprise", Tata McGraw Hill.
- 6) Chander, Harish," Cyber Laws And It Protection " , PHI Learning Private Limited ,Delhi ,India
- 7) Donaldson, S., Siegel, S., Williams, C.K., Aslam, A., Enterprise Cybersecurity-How to Build a Successful Cyberdefense Program Against AdvancedThreats, A-press

## **Web Resources:**

1. [https://www.cisco.com/c/en\\_in/products/security/what-is-cybersecurity.html](https://www.cisco.com/c/en_in/products/security/what-is-cybersecurity.html)
2. <https://www.paloaltonetworks.com/cyberpedia/what-is-cyber-security>

## LIST OF EXPERIMENTS

| <b>Experi<br/>ment.<br/>No.</b> | <b>Title</b>                                                                                    | <b>Learning<br/>Outcomes</b> |
|---------------------------------|-------------------------------------------------------------------------------------------------|------------------------------|
| 1                               | TCP scanning using NMAP.                                                                        | CO4                          |
| 2                               | Port scanning using NMAP.                                                                       | CO4                          |
| 3                               | TCP / UDP connectivity using Netcat.                                                            | CO4                          |
| 4                               | Network vulnerability using OpenVAS.                                                            | CO2                          |
| 5                               | Web application testing using DVWA.                                                             | CO4                          |
| 6                               | Install VM Workstation in Ubuntu and set up Windows and Kali.                                   | CO6                          |
| 7                               | Write a program to sniff packet sent over the local network.                                    | CO4                          |
| 8                               | Create virus with python script and implement attack and analyze the effect of various viruses. | CO2                          |
| 9                               | Sniffing Website Credentials using Social Engineering Toolkit.                                  | CO4                          |
| 10                              | Study and Audit Indus University IT Infrastructure.                                             | CO6                          |

**Subject: Block Chaining**

**Program: B. Tech CE/CSE/IT**

**Subject Code: CE0722**

**Semester: VII**

| Teaching Scheme (Hours per week) |          |           |         | Examination Evaluation Scheme (Marks) |                                  |                                              |                                                 |       |
|----------------------------------|----------|-----------|---------|---------------------------------------|----------------------------------|----------------------------------------------|-------------------------------------------------|-------|
| Lecture                          | Tutorial | Practical | Credits | University Theory Examination         | University Practical Examination | Continuous Internal Evaluation (CIE)- Theory | Continuous Internal Evaluation (CIE)- Practical | Total |
| 3                                | 0        | 2         | 5       | 40                                    | 40                               | 60                                           | 60                                              | 200   |

**Course Objectives:**

1. Understand Block chain technology.
2. Develop block chain based solutions and write smart contracts using Hyperledger Fabric and Ethereum frameworks.
3. Build and deploy block chain application for on premise and cloud based architecture.

**CONTENTS**

**UNIT-I**

**[12 hours]**

**Introduction:**

Overview of Block chain, Public Ledgers, Bitcoin, Smart Contracts, Block in a block chain, Transactions, Distributed Consensus, Public vs Private Block chain, Understanding Crypto currency to Block chain, Permissioned model of Block chain.

**Basic Crypto Primitives:**

Cryptographic Hash Function and its properties, Hash pointer and Merkle tree, Digital Signature, Public key cryptography.

**UNIT-II**

**[12 hours]**

**Understanding Block chain with Cryptocurrency:**

Bitcoin and Block chain: Creation of coins, payments and Double spending, Bitcoin Scripts, Bitcoin B2B Network, Transaction in Bitcoin network, Block mining, Block propagation and block relay.

**Working with Consensus in Bitcoin:**

Distributed consensus in open environments, Consensus in Bitcoin network, Proof of Work(PoW)-basic introduction, Hash cash PoW, Attacks on PoW and the monopoly problem, Proof of Stake, Proof of Burn, Proof of Elapsed Time, The life of Bitcoin Miner, Mining difficulty, Mining pool.

**UNIT-III****[12 hours]****Understanding Block chain for Enterprise:**

Permissioned model and Use cases, Design issues for permissioned block chain, Execute Contracts, Overview of Consensus models for permissioned block chain,- Distributed Consensus in closed environment, Paxos, RAFT, Byzantine general problem, Byzantine fault tolerant, Pease BFT algorithm, BFT over asynchronous system.

**Enterprise application of Block chain:**

Cross border payments, Know Your Customer(KYC), Food security, Mortgage over Block chain, Block chain enabled trade, Supply chain Financing, Identity on Block chain.

**UNIT-IV****[12 hours]****Block chain application development:**

Hyperledger Fabric – Architecture, Identities and policies, Membership and Access Control, Channels, Transactions validation, Writing Smart Contracts using Hyperledgers, Overview of Ripple and Corda.

**Course Outcomes:**

At the end of this subject, students should be able to:

1. Understand what and why of Blockchain and also its major components.
2. Learn about Bitcoin, Cryptocurrency, Ethereum
3. To provide conceptual understanding of how block chain technology can be used to innovate and improve business process.
4. Learn about Hyperledger fabric model and its architecture.
5. Covers the technological underpinning of block chain operations in both theoretical and practical implementation of solutions using block chain technology.
6. Build and deploy block chain application for on premise and cloud based architecture for better employability.

### **Text Books:**

1. Blockchain: Blueprint for a New Economy by Melanie Swan 1<sup>st</sup> edition, O'Reilly, 2015, Kindle Edition.

### **Reference Books:**

1. Blockchain Revolution: How the Technology Behind Bitcoin Is Changing Money, Business, and the World by Don Tapscott and Alex Tapscott
2. The Age of Cryptocurrency: How Bitcoin and Digital Money Are Challenging the Global Economic Order by Paul Vigna and Michael J. Casey
3. Mastering Blockchain: Distributed ledger technology, decentralization, and smart contracts explained, 2nd Edition by Imran Bashir
4. Blockchain Basics: A Non-Technical Introduction in 25 Steps | by Daniel Drescher
5. Mastering Bitcoin: Programming the Open Blockchain | by Andreas M. Antonopoulos
6. The Complete Guide to Understanding Blockchain | by Miles Price

### **Web Resources:**

1. <https://blockgeeks.com/guides/what-is-blockchain-technology/>
2. <https://www.edureka.co/blog/blockchain-tutorial/>
3. <https://www.guru99.com/blockchain-tutorial.html>
4. <https://blockchaintutorial.net/>

## **LIST OF EXPERIMENTS**

| <b>Experim<br/>ent<br/>No.</b> | <b>Title</b>                                                                                                       | <b>Learning<br/>Outcomes</b> |
|--------------------------------|--------------------------------------------------------------------------------------------------------------------|------------------------------|
| 1                              | Install and understand Docker container, Node.js, Hyper ledger fabric and perform necessary software installation. | Installation                 |
| 2                              | Create and deploy a block chain network.                                                                           | Deployment                   |
| 3                              | Interact with block chain network. Execute transactions and requests against a block chain network.                | Understand the architecture  |
| 4                              | Use block chain to track fitness club rewards.                                                                     | Hands on                     |

|    |                                                     |                       |
|----|-----------------------------------------------------|-----------------------|
| 5  | Car auction network.                                | practice              |
| 6  | Deploy an asset transfer app using blockchain.      |                       |
| 7  | Develop an IoT asset tracking app using blockchain. |                       |
| 8  | Digital Certificates                                |                       |
| 9  | Implement secure Hash Algorithm.                    | Implementation of SHA |
| 10 | Case Study.1                                        | Case Study            |
| 11 | Case Study 2                                        | Case Study            |

**Subject: Cloud Computing**

**Program: B. Tech CE/CS/IT**

**Subject Code: :CE0723**

**Semester: VII**

| Teaching Scheme (Hours per week) |          |           |         | Examination Evaluation Scheme (Marks) |                                  |                                              |                                                 |       |
|----------------------------------|----------|-----------|---------|---------------------------------------|----------------------------------|----------------------------------------------|-------------------------------------------------|-------|
| Lecture                          | Tutorial | Practical | Credits | University Theory Examination         | University Practical Examination | Continuous Internal Evaluation (CIE)- Theory | Continuous Internal Evaluation (CIE)- Practical | Total |
| 3                                | 0        | 2         | 4       | 40                                    | 40                               | 60                                           | 60                                              | 200   |

### Course Objectives:

1. Identify the technical foundations of Cloud systems architecture.
2. Analyze the problems and solutions to cloud application problems software that helps in skill development.
3. Identify the research scope in cloud computing that enhances entrepreneurship skills in students.
4. Describe various service delivery models of cloud computing architecture, and the ways in which clouds can be deployed as public, private, hybrid, and community clouds.
5. Comprehend the technical capabilities and business benefits of virtualization and cloud computing that enhance the employability skills of students.
6. Describe the landscape of different types of virtualization and understand the different types of clouds.

## CONTENTS

### UNIT-I

[12 hours]

**Introduction to Cloud Computing Cloud Computing:** Overview, History of Cloud Computing, Layers and Types of Cloud, Offerings of a cloud, Software-as-a-Service, Platform-as-a-Service, Infrastructure-as-a-Service, Challenges and Risks.

**Cloud Computing Architecture and Vitalization:** Cloud Computing Architecture, Deployment Models, Virtualization, XML Basics, web Services, Service Oriented Architecture.



## **UNIT-II**

**[12 hours]**

**Managing Cloud and SLA:** Managing cloud data, Introduction to MapReduce, OpenStack, Cloud Economics, Service Level Agreement (SLA), Resource Management, Case Studies Commercial Cloud and Google Cloud Platform.

**Virtualization of the resource provisioning:** Virtual machine technology, virtualization applications in enterprises, Drawbacks of virtualization.

**Multitenancy on offering:** Multi-entity support, Multi-schema approach, Multitenancy using cloud data stores, Data access control for enterprise applications.

## **UNIT-III**

**[12 hours]**

### **Cloud Security Aspects:**

**Cloud security fundamentals** Vulnerability assessment tool for cloud, Privacy and Security in cloud

**Cloud computing security Structure** Architectural Considerations- General Issues, Trusted Cloud computing, Secure Execution Environments and Communications, Micro- architectures; Identity Management and Access control Identity management, Access control, Autonomic Security, Virtualization security management virtual threats, VM Security Recommendations, VM-Specific Security techniques.

**Cloud computing security Issues:** Cloud Computing: Security Issues in Collaborative SaaS, Cloud Computing: Broker for Cloud Marketplace

## **UNIT-IV**

**[12 hours]**

**Recent trends and Research scope in cloud computing:** Mobile cloud Computing, Fog Computing, Geo-Spatial cloud, Green Cloud Computing, IoT Cloud, Big Data and Cloud Computing, Introduction to Docker Container, Research Scope of the Cloud Computing, Open Source and Commercial Clouds, Cloud Simulator

## **Course Outcomes**

At the end of this subject, students should be able to:

1. Articulate the main concepts, key technologies, strengths and limitations of cloud computing.
2. Implement the virtual cloud.
3. Security perusal of data in cloud environment.
4. Compare various cloud service provider architecture.
5. Illustrate and choose the appropriate technologies, algorithms and approaches for implementation and use of cloud.
6. Explore the research scope of cloud computing

## **Text Books:**

1. Rajkumar Buyya, Cloud Computing: Principles and Paradigms, John Wiley & Sons, First Edition
2. Gautam Shroff, Enterprise Cloud Computing: Technology, Architecture, Applications, Cambridge University Press, First Edition Judith Hurwitz, R Bloor, M.Kanfman, F.Halper, Cloud Computing for Dummies, Wiley India Edition, First Edition

## **Reference Books:**

1. Anthony T Velte, Cloud Computing : A Practical Approach, McGraw- Hill Osborne, First Edition
2. Barrie Sosinsky, Cloud Computing Bible, Wiley India, First Edition
3. Ronald Krutz and Russell Dean Vines, Cloud Security, Wiley-India, First Edition
4. Tim Malhar, S. Kumaraswamy, S.Latif, Cloud Security & Privacy, O'Really Publications, First Edition
5. Scott Granneman, Google Apps, Pearson, First Edition

## **Web Resources**

1. <http://cloudbus.org>
2. [Http://www.salesforce.com/in/cloudcomputing/](http://www.salesforce.com/in/cloudcomputing/)
3. <http://www.ibm.com/cloud-computing/in/en/what-is-cloud-computing.html>
4. [http://www.rackspace.com/cloud/what\\_is\\_cloud\\_computing](http://www.rackspace.com/cloud/what_is_cloud_computing)
5. <http://aws.amazon.com/>
6. <http://www.microsoft.com/en-in/server-cloud/cloud-os/>
7. <http://azure.microsoft.com/en-in/>
8. <https://cloud.google.com/>

9. <https://cloud.google.com/products/>

### **LIST OF EXPERIMENTS**

| <b>Experiment. No.</b> | <b>Title</b>                                                                                                                                                                                                                                                                     | <b>Learning Outcomes</b>                                        |
|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|
| 1                      | Sketch out and analyze architecture of Cloudsim and identify different entities to understand the structure of cloudsim                                                                                                                                                          | Usage of CLOUDSim and Architecture of the same.                 |
| 2                      | Create a scenario in cloudsim to create a datacenter along with one host. Also create one virtual machine with static configuration to run one cloudlet on it.                                                                                                                   | Working of the data centers in cloud environment.               |
| 3                      | Illustrate a scenario in cloudsim to create one datacenter and one host. Also implement required virtual machines to run two cloudlets on it. Assume that cloudlets run in VMs with the same MIPS requirements. The cloudlets will take the same time to complete the execution. | Understanding the cloudlets request in a cloud scenario         |
| 4                      | Implement a datacenter with two hosts and run two cloudlets on it in cloudsim. Consider the cloudlets run in VMs with different MIPS requirements. The cloudlets will take different time to complete the execution depending on the requested VM performance.                   | Analyzing the cloud performance in the distinct scenario.       |
| 5                      | Design a program in cloudsim to create two data centers with one host and run two cloudlets on it.                                                                                                                                                                               | Multiple cloudlet execution in the cloud.                       |
| 6                      | Construct a case in cloudsim to create two datacenters with one host each and run cloudlets of two users on them.                                                                                                                                                                | Multiple data center approach and its performance on the cloud. |

|    |                                                                                                                                                                                |                                               |
|----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|
| 7  | Make and perform scenario to pause and resume the simulation in cloudsim, and create simulation entities (a Datacenter Broker) dynamically                                     | Understanding the Broker concept with example |
| 8  | Organize a case in cloudsim for simulation entities (a Datacenter Broker) in run-time using a global manager entity (Global Broker).                                           | Understanding the global manager in cloud.    |
| 9  | Sketch out and analyze architecture of Microsoft Azure.                                                                                                                        | Working of AZURE cloud.                       |
| 10 | Implement a web application using Microsoft Azure account as a cloud service by creating a web page and database. Also provide database connectivity with implemented webpage. | Utilizing the cloud services.                 |

**Subject: Software Group Project-I**

**Program: CE/CS/IT**

**Subject Code: CE0727**

**Semester: VII**

| Teaching Scheme (Hours per week) |          |           |         | Examination Evaluation Scheme (Marks) |                                  |                                              |                                                 |       |
|----------------------------------|----------|-----------|---------|---------------------------------------|----------------------------------|----------------------------------------------|-------------------------------------------------|-------|
| Lecture                          | Tutorial | Practical | Credits | University Theory Examination         | University Practical Examination | Continuous Internal Evaluation (CIE)- Theory | Continuous Internal Evaluation (CIE)- Practical | Total |
| 0                                | 1        | 2         | 2       | 0                                     | 0                                | 0                                            | 100                                             | 100   |

## Contents

### Introduction

#### (A) Project Category:

- **Industry Defined Project (IDP):** IDP is a category of the project in which individual student or groups works for their industry defined problem definition within the industry premises.
- **User Defined Project (UDP):** UDP is the category of project in which a group or individual student decides to make their own project under the mentorship of internal guide.

#### (B) Selection of Group, Definition, Tutorial:

- **Selection of Group:** The number of students per group for a project has to be decided with prior approval of Project/ Subject Coordinator.
- **Project Definition:** Student is expected to search the Project Definition.
- **Tutorial:** It should be used for discussion on project types, technologies and design of the project.

#### (C) Learning and Progress:

- **Literature survey/Analysis:** The student is advised to do some case study in form of Literature Review/Analysis related to the Previous Projects/Problems.
- **Methodology/Software tools:** Student is expected to figure out specifications, methodology, resources required, critical issues involved in software design and for project development.

**(D) Submission of the Case Study Report:**

- **Case study report:** Copies of the Case Study report should be submitted to the Course Coordinator.

**(E) Evaluation:**

- **Case study and Project Evaluation:** At end of the semester, students are required to submit a Case study report and Present their Project through a power point presentation about 20-25 minutes.

**(F) Evaluation criteria:**

- Technical Content of Analysis and Case study report
- Quality of Technical Case Study Report
- Presentation (20-25 minutes)
- Regularity and sincerity related to the Work.

**Course Outcomes:**

At the end of the course, students will demonstrate the ability to:

1. Understand project problems using analysis/literature survey.
2. Understand project characteristics and various types and stages of a project.
3. Demonstrate knowledge of contemporary issues in their chosen field of Project.
4. Design and test the prototype/algorithm in order to solve the problem.
5. Understand the fundamentals of project work in end semester project.
6. Work in a group project, it increases the learning potential by experiential and collaborative learning.

**Computer Engineering Department, Indus Institute of Engineering & Technology, Indus University**  
**Program - B. Tech (Computer Engineering/Computer Science & Engineering/Information Technology)**

**SEMESTER VIII**

| Sr.<br>No. |        | Name<br>of the<br>subject | Credit | Teaching Scheme |      |     |                | Evaluation Scheme |     |           |     |       | Segment |
|------------|--------|---------------------------|--------|-----------------|------|-----|----------------|-------------------|-----|-----------|-----|-------|---------|
|            |        |                           |        | (per week)      |      |     |                | Theory            |     | Practical |     | Total |         |
|            |        |                           |        |                 |      |     |                | CIE               | ESE | CIE       | ESE | Marks |         |
|            |        |                           |        | Th.             | Tut. | Pr. | Total<br>(hr.) | Th.               | Th. | Pr.       | Pr. |       |         |
| 1          | CE0816 | Project                   | 14     | 0               | 0    | 28  | 28             | 0                 | 0   | 60        | 40  | 100   | PRJ     |
|            |        | Total                     | 14     | 0               | 0    | 28  | 28             | 0                 | 0   | 60        | 40  | 100   |         |

### Semester wise Credit Breakup

| <b>Semester</b>                | <b>HS</b>   | <b>BS</b>    | <b>ES</b>    | <b>Core</b>  | <b>PE</b>    | <b>OE</b>   | <b>PRJ</b>  | <b>IC</b>   | <b>PC</b>   | <b>Total Credits</b> |
|--------------------------------|-------------|--------------|--------------|--------------|--------------|-------------|-------------|-------------|-------------|----------------------|
| <b>1</b>                       | 3           | 8            | 5            | 0            | 0            | 6           | 0           | 0           | 0           | <b>22</b>            |
| <b>2</b>                       | 3           | 8            | 6            | 0            | 0            | 3           | 0           | 0           | 0           | <b>20</b>            |
| <b>3</b>                       | 2           | 4            | 7            | 8            | 0            | 0           | 0           | 2           | 0           | <b>23</b>            |
| <b>4</b>                       | 2           | 0            | 2            | 12           | 0            | 3           | 0           | 0           | 2           | <b>21</b>            |
| <b>5</b>                       | 0           | 4            | 0            | 16           | 0            | 3           | 0           | 2           | 0           | <b>25</b>            |
| <b>6</b>                       | 0           | 0            | 4            | 8            | 12           | 0           | 0           | 0           | 2           | <b>26</b>            |
| <b>7</b>                       | 0           | 0            | 2            | 7            | 8            | 0           | 0           | 2           | 0           | <b>19</b>            |
| <b>8</b>                       | 0           | 0            | 0            | 0            | 0            | 0           | 15          | 0           | 0           | <b>15</b>            |
| <b>Total Credits as per IU</b> | 10          | 24           | 26           | 51           | 20           | 15          | 15          | 6           | 4           | <b>171</b>           |
| <b>% credit</b>                | <b>5.8%</b> | <b>14.0%</b> | <b>15.2%</b> | <b>29.8%</b> | <b>11.7%</b> | <b>8.8%</b> | <b>8.8%</b> | <b>3.5%</b> | <b>2.3%</b> | <b>100.0%</b>        |