

**ATSS'S**  
**Institute of Industrial & computer Management & Research**  
**Nigdi Pune -44**

Criterion II Teaching Learning and Evaluation

**Key Indicator 2.6 Student Performance and Learning Outcome**

**2.6.2 Attainment of Programme outcomes and course outcomes are evaluated by the institution.**

**Program outcome and Course outcome Calculation**

|  Atss's Institute of Industrial and Computer Management and Research, Nigdi<br>MCA- 1 Sem- I (A.Y. 2021-2022) |                                                                              |                 |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|-----------------|
| <b>Course Outcomes</b>                                                                                                                                                                         |                                                                              |                 |
| <b>Course: IT12:- Data Structure and Algorithms (Theory)</b>                                                                                                                                   |                                                                              |                 |
| <b>Course Outcomes</b>                                                                                                                                                                         | <b>Description</b>                                                           | <b>Mapping</b>  |
| CO-IT 12.1                                                                                                                                                                                     | CO1: demonstrate linear data structures linked list, stack and queue (apply) | PO1,PO2,PO3,PO5 |
| CO-IT 12.2                                                                                                                                                                                     | CO2: implement tree, graph, hash table and heap data structures (apply)      | PO1,PO2,PO3,PO5 |
| CO-IT 12.3                                                                                                                                                                                     | CO3: apply brute force and backtracking techniques (apply)                   | PO1,PO2,PO3,PO5 |
| CO-IT 12.4                                                                                                                                                                                     | CO4: demonstrate greedy and divide-conquer approaches (apply)                | PO1,PO2,PO3,PO5 |
| CO-IT 12.5                                                                                                                                                                                     | CO5: implement dynamic programming technique (apply)                         | PO1,PO2,PO3,PO5 |
|                                                                                                                                                                                                |                                                                              |                 |
| <b>Program Outcomes</b>                                                                                                                                                                        | <b>Description</b>                                                           |                 |

|      |                                                                                                                                                                                                                                                                                   |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PO1  | PO1: Apply knowledge of computing fundamentals, computing specialization, mathematics, and domain knowledge appropriate for the computing specialization to the abstraction and conceptualization of computing models from defined problems and requirements.                     |
| PO2  | PO2: Identify, formulate, research literature, and solve complex Computing problems reaching substantiated conclusions using fundamental principles of Mathematics, Computing sciences, and relevant domain disciplines.                                                          |
| PO3  | PO3: Design and evaluate solutions for complex computing problems, and design and evaluate systems, components, or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.         |
| PO4  | PO4: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions.                                                                                           |
| PO5  | PO5: Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations.                                                                                                     |
| PO6  | PO6: Understand and commit to professional ethics and cyber regulations, responsibilities, and norms of professional computing practice.                                                                                                                                          |
| PO7  | PO7: Recognize the need, and have the ability, to engage in independent learning for continual development as a Computing professional.                                                                                                                                           |
| PO8  | PO8: Demonstrate knowledge and understanding of computing and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments                                                                 |
| PO9  | PO9: Communicate effectively with the computing community, and with society at large, about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations, and give and understand clear instructions. |
| PO10 | PO10: Understand and assess societal, environmental, health, safety, legal, and cultural issues within local and global contexts, and the consequential responsibilities relevant to professional computing practice.                                                             |
| PO11 | PO11: Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary environments.                                                                                                                                                     |
| PO12 | PO12: Identify a timely opportunity and using innovation to pursue that opportunity to create value and wealth for the betterment of the individual and society at large.                                                                                                         |

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Atss's Institute of Industrial and Computer Management and Research, Nigdi

MCA- 1 Sem- II (A.Y. 2021-2022)

Course Exit Survey - Analysis

|                                                                                                 | Code warrior |      |              | Technocrat |      |              | Total     |      |              |
|-------------------------------------------------------------------------------------------------|--------------|------|--------------|------------|------|--------------|-----------|------|--------------|
|                                                                                                 | Excellent    | Good | Satisfactory | Excellent  | Good | Satisfactory | Excellent | Good | Satisfactory |
| How well you can demonstrate linear data structures linked list, stack and queue(CO-IT12.1)     | 47           | 12   | 1            | 47         | 14   | 1            | 94        | 26   | 2            |
| How good you are for implementing tree, graph, hash table and heap data structures. (CO-IT12.2) | 47           | 9    | 4            | 42         | 19   | 1            | 89        | 28   | 5            |
| How well you are able to apply brute force and backtracking techniques(CO-IT12.3)               | 41           | 18   | 1            | 38         | 20   | 4            | 79        | 38   | 5            |
| How well you can demonstrate greedy and divide-conquer approaches. (CO-IT12.4)                  | 42           | 16   | 2            | 36         | 22   | 4            | 78        | 38   | 6            |
| How well you are able to implement dynamic programming technique. (CO-IT12.5)                   | 43           | 14   | 3            | 36         | 21   | 5            | 79        | 35   | 8            |
| CO wise Attainment                                                                              | CW           | TC   | Average      |            |      |              |           |      |              |
| CO-IT 12.1                                                                                      | 2.77         | 2.74 | 2.755        |            |      |              |           |      |              |
| CO-IT 12.2                                                                                      | 2.72         | 2.66 | 2.69         |            |      |              |           |      |              |
| CO-IT 12.3                                                                                      | 2.67         | 2.55 | 2.61         |            |      |              |           |      |              |
| CO-IT 12.4                                                                                      | 2.67         | 2.52 | 2.595        |            |      |              |           |      |              |
| CO-IT 12.5                                                                                      | 2.67         | 2.5  | 2.585        |            |      |              |           |      |              |



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MCA- 1 Sem- II (A.Y. 2021-2022)

CO Attainment

Data Structure and Algorithms

| CO-<br>Assessment tools                                | CO-<br>OC12.1 | CO-<br>OC12.2 | CO-<br>OC12.3 | CO-<br>OC12.4 | CO-<br>OC12.5 |
|--------------------------------------------------------|---------------|---------------|---------------|---------------|---------------|
| <b>Direct Assessment</b>                               |               |               |               |               |               |
| <b>Internal Assessment</b>                             |               |               |               |               |               |
| Assignment1                                            | 3             |               |               |               |               |
| Assignment2                                            |               | 3             | 3             | 3             | 3             |
| Mid Term Exam                                          | 1             | 1             |               |               |               |
| Unit Test 1                                            | 3             |               |               |               |               |
| Unit Test 2                                            |               | 2             |               |               |               |
| Unit Test 3                                            |               |               | 3             |               |               |
| Unit Test 4                                            |               |               |               | 1             |               |
| Unit Test 5                                            |               |               |               |               | 2             |
| Prelim                                                 | 2             | 2             | 2             | 2             | 2             |
| Viva                                                   | 2             | 2             | 2             | 2             | 2             |
| <b>Average direct Assessment=</b>                      | <b>2.2</b>    | <b>2</b>      | <b>2.5</b>    | <b>2</b>      | <b>2.25</b>   |
| A = Internal attainment $\times 0.3=$                  | 0.66          | 0.6           | 0.75          | 0.6           | 0.675         |
| <b>University exams</b>                                |               |               |               |               |               |
| End Sem Result (*)                                     | 3             | 3             | 3             | 3             | 3             |
| B = University Result $\times 0.7=$                    | 2.1           | 2.1           | 2.1           | 2.1           | 2.1           |
| <b>Total Attainment -Direct Assessment D= (A+B)*.7</b> | <b>1.932</b>  | <b>1.89</b>   | <b>1.995</b>  | <b>1.89</b>   | <b>1.9425</b> |
| <b>Indirect Assessment</b>                             |               |               |               |               |               |
| C = Course Exit Survey Attainment                      | 2.58          | 2.49          | 2.41          | 2.385         | 2.415         |
| Total Attainment -Indirect Assessment I= (C)*.3        | 0.774         | 0.747         | 0.723         | 0.7155        | 0.7245        |
| <b>CO Attainment = D+I</b>                             | <b>2.706</b>  | <b>2.637</b>  | <b>2.718</b>  | <b>2.6055</b> | <b>2.667</b>  |



Atss's Institute of Industrial and Computer Management and Research, Nigdi

MCA- 1 Sem- II (A.Y. 2021-2022)

**PO Attainment**

Course: IT12:- Data Structure and Algorithms (Theory)

Name of Faculty: Mr. Sanjay Mate

**Direct PO Attainment**

| CO\PO                        | CO Attainment | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|------------------------------|---------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO-IT 12.1                   | 2.755         | 3   | 3   | 1   |     | 2   |     |     |     |     |      |      |      |
| CO-IT 12.2                   | 2.69          | 3   | 3   | 1   |     | 2   |     |     | 2   |     |      |      |      |
| CO-IT 12.3                   | 2.61          | 3   | 3   | 1   |     | 2   |     |     |     |     |      |      |      |
| CO-IT 12.4                   | 2.59          | 3   | 3   | 1   |     | 2   |     |     |     |     |      |      |      |
| CO-IT 12.5                   | 2.58          | 3   | 3   | 1   |     | 2   |     |     |     |     |      |      |      |
| <b>PO Mapping Factor Sum</b> |               | 15  | 15  | 5   |     | 10  |     |     | 2   |     |      |      |      |

| CO\PO                                         |  | PO1    | PO2    | PO3    | PO4 | PO5   | PO6 | PO7 | PO8   | PO9 | PO10 | PO11 | PO12 |
|-----------------------------------------------|--|--------|--------|--------|-----|-------|-----|-----|-------|-----|------|------|------|
| CO-IT 12.1                                    |  | 8.265  | 8.265  | 2.755  |     | 5.51  |     |     |       |     |      |      |      |
| CO-IT 12.2                                    |  | 8.07   | 8.07   | 2.61   |     | 5.38  |     |     | 5.22  |     |      |      |      |
| CO-IT 12.3                                    |  | 7.83   | 7.83   | 2.61   |     |       |     |     |       |     |      |      |      |
| CO-IT 12.4                                    |  | 7.77   | 7.77   | 2.59   |     |       |     |     |       |     |      |      |      |
| CO-IT 12.5                                    |  | 7.77   | 7.77   | 2.59   |     | 5.16  |     |     |       |     |      |      |      |
| <b>PO Sum</b>                                 |  | 39.705 | 39.705 | 13.155 |     | 26.9  |     |     | 5.22  |     |      |      |      |
| <b>Overall Direct PO Attainment</b>           |  | 2.647  | 2.647  | 2.631  |     | 2.69  |     |     | 2.61  |     |      |      |      |
| <b>A = Overall Direct PO Attainment (80%)</b> |  | 2.1176 | 2.1176 | 2.1048 |     | 2.152 |     |     | 2.088 |     |      |      |      |

**Indirect PO Attainment**

|                                                 |                                |              |              |              |  |              |  |   |              |  |  |  |  |
|-------------------------------------------------|--------------------------------|--------------|--------------|--------------|--|--------------|--|---|--------------|--|--|--|--|
| 20%                                             | Workshop attended              | 0            | 0            | 0            |  | 0            |  | 0 | 0            |  |  |  |  |
|                                                 | Guest Lecture/Seminar attended |              |              |              |  |              |  |   |              |  |  |  |  |
|                                                 | Industry visit                 |              |              |              |  |              |  |   |              |  |  |  |  |
|                                                 | Average                        |              |              |              |  |              |  |   |              |  |  |  |  |
| <b>B = Overall Indirect PO attainment (20%)</b> |                                |              |              |              |  |              |  |   |              |  |  |  |  |
| <b>Overall PO attainment (A+B)</b>              |                                | <b>2.118</b> | <b>2.118</b> | <b>2.105</b> |  | <b>2.152</b> |  |   | <b>2.088</b> |  |  |  |  |

**PO Achievement Matrix**

|                        | PO1    | PO2    | PO3    | PO4 | PO5   | PO6 | PO7 | PO8   | PO9 | PO10 | PO11 | PO12 |
|------------------------|--------|--------|--------|-----|-------|-----|-----|-------|-----|------|------|------|
| Target PO attainment   | 1.8    | 1.8    | 1.8    | 1.8 | 1.5   | 1.5 | 1.5 | 1.5   | 1.5 | 1.5  | 1.5  | 1.5  |
| Achieved PO attainment | 2.1176 | 2.1176 | 2.1048 |     | 2.152 |     |     | 2.088 |     |      |      |      |



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