

**INDIAN INSTITUTE OF TECHNOLOGY TIRUPATI**  
**PROFORMA FOR NEW COURSE**

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| 1.  | Title of the Course  | Design and Analysis of Algorithms              |
| 2.  | Course Number  | CS3101   |
| 3.  | Status of the Course   | Core   |
| 4.  | Structure of Credits   | 3-0-0-3  |
| 5.  | Offered To   | UG   |
| 6.  | New Course/Modification to   | New  |
| 7.  | To be Offered by   | Department of Computer Science and Engineering |
| 8.  | To take effect from  | July 2018                                      |
| 9.  | Prerequisite   | Nil  |
| 10. | Whether approved by the Department   | Yes  |
| 11. | <b>Course Objective:</b> To solve computational problems using different algorithmic paradigms in a systematic way; In each paradigm, the emphasis is on proof of correctness and computational complexity of algorithms.  |  |
| 12. | <b>Course Content:</b> Problem-solving and algorithmic thinking; Running time analysis: asymptotic notation, worst case running time, recurrence trees, repeated substitution, substitution method and Master's theorem; Algorithmic paradigms: incremental design, decremental design, divide and conquer, dynamic programming, backtracking, branch and bound; Greedy algorithms: greedy choice, optimal substructure property, fractional knapsack, and Huffman coding; Graph Algorithms: Prim's, Kruskal's, Dijkstra's, Bellman-Ford and Floyd-Warshall algorithms; String matching: Boyer-Moore algorithm, Rabin-Karp algorithm; Modular arithmetic algorithms; Hashing techniques; NP-completeness: reduction amongst problems, classes P, NP, NP-hard, NP-complete, and polynomial time reductions. |  |
| 13. | Text book(s):<br>1. Cormen T H, Leiserson C, Rivest R L and Stein C, <i>Introduction to Algorithms</i> , 3rd Edition, MIT Press (2009).  |  |
| 14. | Reference(s):<br>1. Dasgupta S, Papadimitriou C and Vazirani U, <i>Algorithms</i> , McGraw-Hill Education (2006).<br>2. Kleinberg J and Tardos E, <i>Algorithm Design</i> , Pearson (2005).  |  |