Reg.No. \_\_\_\_\_\_\_\_\_\_\_\_



**UNIVERSITY**

(Karunya Institute of Technology & Sciences)

(Declared as Deemed-to-be University under Sec.3 of the UGC Act, 1956)

**End Semester Examination – Nov/Dec– 2017**

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| **Code :** | **14CS2001** | **Duration :** | **3hrs** |
| **Sub. Name :** | **ANALYSIS OF ALGORITHMS** | **Max. marks :** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

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| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | Consider the following algorithm. What is its basic operation? How many times is the basic operation executed? What is the time complexity of the algorithm?  int*fun*(int n)  {  int count = 0;  for (int i = 0; i< n; i++)  for (int j = i; j > 0; j--)  count = count + 1;  return count;  } | CO1 | 10 |
| b. | Write a recursive solution for finding the number of binary digits in the binary representation of a positive integer. Set up a recurrence relation for the algorithm’s basic operation and solve it. | CO1 | 10 |
| (OR) | | | | |
| 2. |  | Discuss the asymptotic notations Big-oh, Big-omega and Big-theta with appropriate graph representations and examples. | CO1 | 20 |
| 3. | a. | Explain with algorithm the working of Merge Sort to sort the following list in alphabetical order and also derive its worst case complexity.  F, A, N, T, A, S, T, I, C | CO1 | 15 |
|  | b. | Write down binary search algorithm and it’s time complexity. | CO2 | 5 |
| (OR) | | | | |
| 4. | a. | Write down insertion sort algorithm and give the time complexity. Show how it works by applying the algorithm to sort the following list:  100, 25, 75, 125, 45, 200, 150, 35 | CO2 | 10 |
|  | b. | Demonstrate Brute Force string matching algorithm with example. Analyze the time complexity of the algorithm. | CO2 | 10 |
| 5. |  | Write Floyd’s algorithm to calculate the cost of all pair’s shortest paths. Apply the algorithm to find the cost of the shortest path between each pair in the following graph. | CO3 | 20 |
| (OR) | | | | |
| 6. |  | The following instance gives weights and values of 4 items. Using dynamic programming technique, find the most valuable subset of the items that fit into the knapsack of capacity 10.   |  |  |  | | --- | --- | --- | | *Item* | *Weight*  *(kg)* | *Value*  *(Rupees in lacs)* | | 1 | 7 | 42 | | 2 | 3 | 12 | | 3 | 4 | 40 | | 4 | 5 | 25 | | CO3 | 20 |
| 7. | a. | Apply Prim’s algorithm to construct Minimum Spanning Tree for the following graph: | CO2 | 10 |
|  | b. | Using Dijkstra’s algorithm, find the shortest path from the vertex ‘P’ to all the remaining vertices: | CO2 | 10 |
| (OR) | | | | |
| 8. | a. | Construct Huffman tree for the following data and obtain it’s Huffman code:   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | Symbol | A | B | C | D | E | | Frequency | 24 | 12 | 10 | 8 | 8 |   Decode the text whose encoding is 1001111010110 | CO2 | 10 |
|  | b. | Explain a search procedure using divide and conquer technique. Prove that the procedure works correctly. Give the time complexity of the algorithm. | CO2 | 10 |
|  | | **Compulsory**: |  |  |
| 9. | a. | Apply Horspool’s algorithm to search for the pattern BAOBAB in the text BESS\_KNEW\_ABOUT\_BAOBABS and also explain how shift takes place based on the text character when   1. the character is not in the pattern 2. the character is in pattern (but not the rightmost) 3. the rightmost characters do match | CO3 | 10 |
|  | b. | Write a detailed note on P and NP class problems | CO3 | 10 |

ALL THE BEST