BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: BE **SEMESTER : V**
BRANCH: IT **SESSION : MO/18**

SUBJECT: IT5027 DESIGN OF COMPUTER ALGORITHM

TIME: 3 HOURS **FULL MARKS: 60**

INSTRUCTIONS:
1. The question paper contains 7 questions each of 12 marks and total 84 marks.
2. Candidates may attempt any 5 questions maximum of 60 marks.
3. The missing data, if any, may be assumed suitably.
***4*. Before attempting the question paper, be sure that you have got the correct question paper.**
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

Q.1(a) Prove that $2^{n+1}+ 5n$ is $O(2^n)$. [2]
Q.1(b) What is double link list? Write the difference between double link list and singly link list. [4]
Q.1(c) Explain the mathematical analysis steps of non-recursive algorithms with an example. [6]

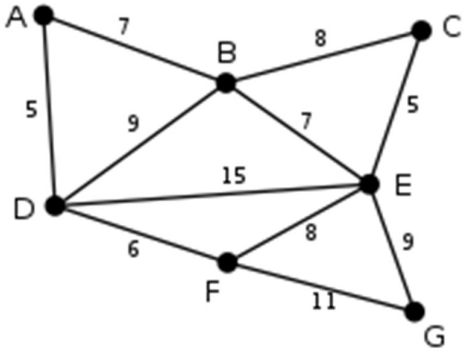
Q.2(a) Write the pseudo code of merge sort algorithm. [2]
Q.2(b) What is stability in sorting algorithms? Explain with an example. [4]
Q.2(c) What is a decrease & conquer algorithm? Explain with an example and show all the intermediate states. [6]

Q.3(a) Write a transform & conquer method to evaluate a polynomial equation. [2]
Q.3(b) What is a decrease by a constant algorithm? Explain with an example. [4]
Q.3(c) What is strassens matrices multiplication? Explain the algorithm and show how it is better. [6]

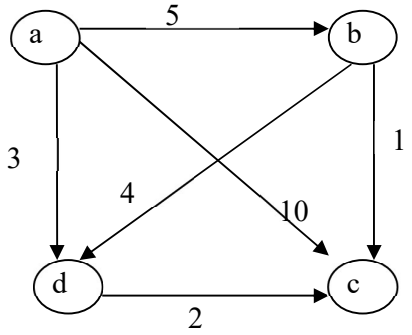
Q.4(a) Write a pseudo code for Dijkstra algorithm. [2]
Q.4(b) A data file of 1,00,000 characters contains only the characters a-f with the frequencies as indicated in table. using variable length code calculate number of bits to encode the file. [4]

a	b	c	d	e	f
45	13	12	16	9	5

Q.4(c) Write the pseudo code of krushkal algorithm. Find the Minimal cost Spanning tree for the given graph. [6]



Q.5(a) What is dynamic programming approach? Write it's advantages and limitations. [2]
Q.5(b) Find the shortest paths between all pairs of vertices for the given graph [4]



PTO

Q.5(c) What is optimal binary search tree? Contract the optimal tree from the given data. [6]

keys	15	25	35	45
Frequencies	4	2	6	3

Q.6(a) What is backtracking? Write its advantages and limitations. [2]
Q.6(b) What is branch and bound approach? Briefly explain with example. [4]
Q.6(c) What is traveling salesman problem? Solve the problem for the given cost adjacency matrix. [6]

$$\begin{pmatrix} \infty & 20 & 30 & 10 & 11 \\ 15 & \infty & 16 & 4 & 2 \\ 3 & 5 & \infty & 2 & 4 \\ 19 & 6 & 18 & \infty & 3 \\ 16 & 4 & 7 & 16 & \infty \end{pmatrix}$$

Q.7(a) What is the difference between NP and NP complete problem? [2]
Q.7(b) Vertex Cover problem is belongs to which class of problem? Explain how it's belongs to it. [4]
Q.7(c) Discuss some approximation algorithm for NP hard problems [6]

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