JAYPEE INSTITUTE OF INFORMATION TECHNOLOGY, NOIDA

* Required

1. Email address *

    _____

2. Name *

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3. Enrollment No. *

    _____

4. Batch *

    _____

JAYPEE INSTITUTE OF INFORMATION TECHNOLOGY, NOIDA

TEST-2 EXAMINATION -2020-21

B.TECH. III SEMESTER, ODD SEMESTER

Course Title: Data Structures and Algorithms	Maximum Marks: 20
Course Code: 18B11CS211	Maximum Time: 01 Hr

Note:
1. This is a paper and pen examination. Answers have to be written on papers only in your own handwriting. No answer has to be given on the Google Form.
2. On the top of your answer sheet, Write your Name, Enrollment number, Batch, Course Name and Course Code.
3. Answer should be uploaded collectively at the end of examination in a **single PDF file of size less than 10MB.**

Questions 1-10 is of 1 Mark each

CO4: Q1) The maximum number of edges a directed graph with n vertices without a directed cycle is_____.

CO1: Q2) The time complexity of $\Sigma_{i=1}^{n} \log i$ is _____.

CO1: Q3) The minimum number of comparisons required to find the minimum and the maximum of 100 numbers is |_____.

CO4: Q4) The number of different minimum spanning tree for a hexagon is _____.

CO4: Q5) The time complexity of shortest path in a weighted acyclic graph is _____.

CO4: Q6) A planar grapgh is a graph that can be drawn on a plane without edges crossing. The chromatic number required for colouring all the vertexes in a planar graph is _____.

CO4: Q7) Consider an undirected random graph of eight vertices. The probability that there is an edge between a pair of vertices is 1/2. The expected number of unordered cycles of length 3 is _____.

CO4: Q8) The number of times a node is visited in DFS is _____.

CO2: Q9) The pre-order traversal sequence of a BST is 30, 20, 10, 15, 25, 23, 39, 35, 42. The post-order traversal sequence of the same BST tree is _____.

CO4: Q10) The number of multiplications of two different 32 digit numbers by applying efficient divide and conquer approach is _____.

CO4: Q11) [3 Marks] There are N centres in the world which are trying to develop vaccine for COVID-19 virus. Each centre is having the details of the COVID-19 virus strain in their own country. All the centres want to share their individual COVID-19 virus strain data with each other by sending electronic messages. Assume that a centre includes all the virus data it possesses at the time the message is sent and that a message can be sent to only one centre. Design a greedy algorithm that always yields the minimum number of messages, the centres need to send to guarantee that every centre gets all the COVID-19 virus strains.

CO4: Q12) [4 Marks] A XYZ bank wants to check for the fraud detection of N debit cards. These cards have been collected in suspicion of fraud. Each debit card is a small plastic object containing a magnetic stripe with some encrypted data. It is associated with only unique bank account. Each bank account can have many debit cards corresponding to it (dependents/spouse). The bank has a specialised machine that takes two debits cards and after performing some checks determines whether they are equivalent or not. Two debits cards are equivalent if they correspond to the same bank account.
You have given the task whether among the collection of N cards, is there a set of more than N/2 of them that are all equivalent to one another? Assume that the only feasible operations you can do with the cards are to pick two of them and plug them into the specialised machine. Design a divide and conquer algorithm which solves the above problem in O(nlog n) calls to the specialised machine.

CO3: Q13) [3 Marks] Write an efficient algorithm that will count the number of connected components of a Graph G represented by an adjacency matrix.

5. Answer should be uploaded collectively at the end of examination in a single PDF file with " EnrollmentNo-Name-pdf"of size less than 10MB. *

    Files submitted:

Google Forms