Monthly Periodic Quiz 01

Instructions

- You have **60 minutes to earn a maximum of 30 points**. Do not spend too much time on any one problem. Skim them all first, and attack them in the order that allows you to make the most progress.
- When writing an algorithm, **a clear description in English will suffice**. Pseudo-code is not required. Be sure to argue that your algorithm is correct.
- **Pay close attention to the instructions for each problem**. Depending on the problem, partial credit may be awarded for incomplete answers.
- Only **the handwritten versio**n of the answers will qualify for the submission.
- No plagiarism would be considered and if found – 10 points would be awarded.
- Email the solution at *therajatraiofficial@gmail.com.*

Problems	Points
1. The Work Efficiency Problem	2
2. The OTP System	5
3. The Connection	3
4. The Problem Solving	8
5. The Number System	12
Total	30

Problem 01. [The Work Efficiency Problem] 2 Points

The work efficiency formula is efficiency = output / input, and you can multiply the result by 100 to get work efficiency as a percentage. Write an algorithm to find the work efficiency of a machine and also its efficiency percentage.

Problem 02. [The OTP system] 5 Points

A one-time password (OTP) is an automatically generated numeric or alphanumeric string of characters that authenticates a user for a single transaction or login session. A website stores the 3-digit generated OTP in a list format for example:

| 456	854	789	632	147	896	321	951	753	145

Each time a user login the website the OTP updates itself by adding twice of the only even prime number, for example:

456 would become 456+2(even prime number).*

Write an algorithm for updating the OTPs on successful login. Assume the conditions for the same. If the number of successful logins is 150 and each update of an OTM takes 2 units of time then, what would be the total unit of time the algorithm would take to update the OTPs of each successful login.

Problem 03. [The Connection] 3 Points

Rani runs a startup based in Bengaluru. She has a small team of 10 members and they are joining the office for the first time after 2 years of remote work. Based on the blueprint of her new office, determine the suitable type of network based on geographical area and the suitable topology for her office. Justify your decisions.
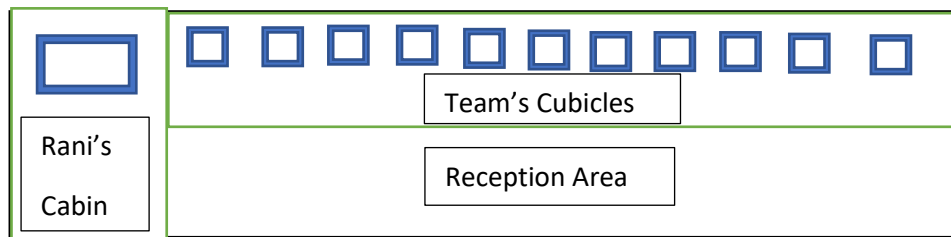
Problem 04. [The Problem Solving] 8 Points

Computer science is the study of problems, problem-solving, and the solutions that come out of the problem-solving process. What is an algorithm? Justify how algorithms help us in problem solving. Also, design a flow chart describing the problem-solving process. Prepare a table consisting of the components of a flowchart and their functions.

Problem 05. [The Number System] 12 Points

Bharati wanted to find a way to ensure that, no one could read her secret diary which she maintains over her email platform. She converted each letter of the words into its positional numerical equivalence in the English alphabet and then that number into binary. For example, D would be converted into 4 and the 4 would be converted into 100 as binary. For space between two words, she used 0. Help her to cipher the text below with the above method. Demonstrate the steps implemented.

It was a good day.

x-x-x-x-x-x-x-x-x-x-x-x-x-x- End of the Question Paper -x-x-x-x-x-x-x-x-x-x-x-x-x-x

Instructions for the Answer Sheet

- It must contain the name, date and the time at which you started the exam.
- The PDFs text should be clear enough to be marked and evaluated.
- Denote the total number of sheets attached in the answer sheet.
- All these information should be on the front page.