Indian Institute of Technology (BHU)
Department of Computer Science and Engineering

CSE-502: Computer Systems

Mid Semester Examination, Date: 10.09.2024

Timing: 01:30 PM to 03:30 PM | Odd 2024-25, M.Tech/Ph.D. | Max Marks: 30

Read the questions carefully and write ONLY what is asked in the question

1. Consider the magnet puzzle problem given in Figure 1 with standard constraints. Provide the answer by arranging magnets and drawing step-wise figures reaching the final solution from the initial empty matrix. You need to draw the diagrams and annotate wherever required. Do not write any algorithm or theory about the problem **(5)**

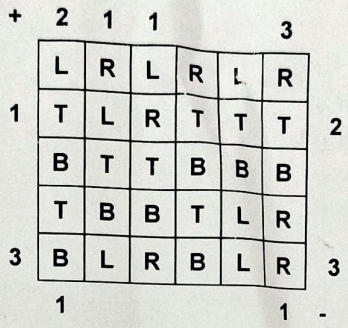

Figure 1: Constrained Magnet Puzzle

2. Solve the set of congruent equations shown in Equation Set 1 as below and find the value of x using the Chinese Remainder Theorem. **(5)**

$$\begin{aligned} x &\equiv 3(mod(8)) \\ x &\equiv 5(mod(9)) \\ x &\equiv 7(mod(10)) \end{aligned} \tag{1}$$

Solve the equation step by step and write the formulas wherever required. Half (0.5) mark will be deducted for each missed or jumped step.

3. Write a step by step solution to find the first occurrence of the pattern P in the text T using KMP algorithm as shown in Equation set 2.

$$P = AABAAA$$
$$T = ABABAABAABAAABAAABAABAABAAA \quad (2)$$

No theory about KMP is required. **(5)**

4. Write an algorithm strictly is pseudo-code format for the Egg Dropping Problem. Write the algorithm ONLY without any theoretical explanation. However, comments can be added to the algorithm itself. 0 marks will be awarded if algorithm is written in any other format. **(5)**

5. You have a CSV file containing 10 columns and 100 rows. Write a shell script to extract all columns in different text files. Then, remove all entries in all files with non-alphanumeric values. Then, change the permission of files to have complete admin privilege and no privilege to others. Finally, delete the original CSV file. Half (0.5) mark will be deducted for each of the wrong syntax used in the script. **(5)**

6. Explain the following Linux commands using an example ONLY. Write the example first and then explain that example. **(5)**

   1. pwd
   2. touch
   3. cat
   4. top
   5. pgrep

   If the given example is found incorrect then 0 marks will be awarded for that answer.