Sir Syed University of Engineering & Technology
Faculty of Basic & Applied Sciences
Department of Computer Science

End Semester Examinations (Spring 2020)

Course Title with Code	**CS-425: Design and Analysis of Algorithms**	**Program**	BS(CS)
Instructor	**Dr. Usman Amjad and Mr. Faraz Khan**	**Semester**	7th
Start date & Time	July04, 2020 at 11:30 AM	**Submission Deadline**	July04, 2020 at 5:30PM
Maximum Marks	50		

IMPORTANT INSTRUCTIONS:

Read the following Instructions carefully:

- Attempt All Questions on MS-Word. Font theme and size must be Times New Roman and 12 points respectively. Use line spacing 1.5. Convert file to PDF format before submitting.
- You may provide answers HANDWRITTEN. The scanned solution must be submitted in PDF file format (Use any suitable Mobile Application for Scanning)
- For Diagrams, you can use paper and share a clear visible snapshot in the same Answer Sheet.
- Arrange questions and their subsequent parts in sequence.
- Make sure that your answers are not plagiarized or copied from any other sources. In case of plagiarism, **ZERO** marks will be awarded.
- Provide relevant, original and conceptual answers, as this exam aims to test your ability to examine, explain, modify or develop concepts discussed during the course.
- Recheck your answer before the submission on **VLE** to correct any content or language related errors.
- You must upload your answers via the VLE platform ONLY.

You must follow general guideline for students before online examination and during online examination which had already been shared by email and WhatsApp.

This paper has a total of _03__ pages including this title page

Sir Syed University of Engineering & Technology
Faculty of Basic & Applied Sciences
Department of Computer Science

Q.1 (10)

(a) Recursion is more efficient techniques than iteration for large data input having n items. Justify with any problem with recursion first and then solve same problem with iteration and compare the primitive operations. Use sum of your two digit date of birth as **n** for solving the problem. (for 25 january n=2+5=7)

(b) Analyze the time complexity of an algorithm for finding minimum and maximum no. of array of Size **n**, through SFC table. (e.g. n = sum of your 3 digit roll#)

Q.2 (10)

(a) Use a strong hash function to avoid checking the pattern in a string using Rabin-karp algorithm. Analyze the best and worst case complexity. Show all necessary steps. Take Text as all characters of your name and Pattern as last 3 characters of your name.
(eg. Name: Ali Ahmed
Text= a l i a h m e d
Pattern= m e d)

(b) Using knuth- Morris-Prall (KMP) algorithm, find out the given pattern in a given string. Show working steps. Also analyze time complexity.Take String as all characters of your name and Pattern as last 4 characters of your name.
(eg. Name: Ali Ahmed
Text= a l i a h m e d
Pattern= h m e d)

Q.3 (10)

Suppose you posses n cubes (variable **n** is (your month of birth) mod 3 +3). The sides of these colours are printed with one of the colours. Red(R), White (W), Blue (B), Yellow (Y).
(e.g. Birth of month is January, so n= (1 mod 3) + 3 = 4)

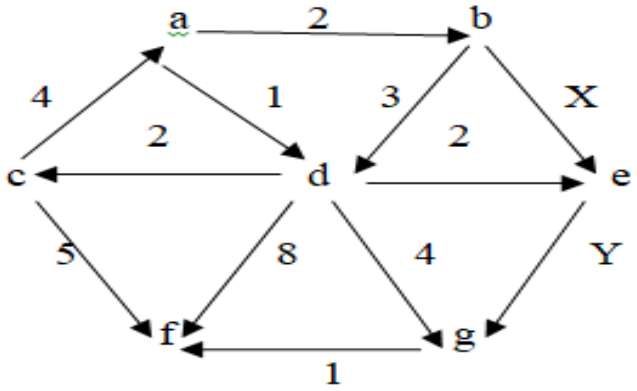
(a) Your job is to place the cubes in a column of four such that all four cubes appear on each of four slides of column.

(b) Solve the couple by using sub graph and interpret what it means to context.

Q.4 (10)

From the given graph, show how Dijkstra's algorithm shortest path work. Show all working steps from explored to unexplored.

Sir Syed University of Engineering & Technology
Faculty of Basic & Applied Sciences
Department of Computer Science



X= first digit of your birth day+1
Y= second digit of your birth day (eg. 25 January: X=2 ; Y=5)

Q.5 **(10)**

Generate a string pattern from your or your guardian's CNIC number in such a way that for digits 0, 1 – A; 2,3 – B; 4,5 – C; 6,7 – D; 8,9 – E. Example if your nic number is 42201-1188994-6 than the generated pattern will be C B BA AAA D D E E B D.
Attach your or your guardian's CNIC which you use for generating data as a proof. Answer without CNIC image will not be accepted.
Solve and compress the generated data by using Huffman coding Tree Algorithm.