

**June 11, 2020, 12:00 pm – 12:40 pm**

<b>Course Code: CS211</b>	<b>Course Name: Discrete Structures</b>
<b>Instructor Names: Mr. Shoaib Raza</b>	
<b>Student Roll No:</b>	<b>Section No:</b>

**Instructions:**

- Read each question completely before answering it. There is only **one question and a single page**.
- In case of any ambiguity, you may make assumption. But your assumption should not contradict any statement in the question paper.
- Answer all the questions in given sequence of the question paper. Step by step solution is required.
- Write your NU ID on the top of every page of answer script. Answer script should be of A4 size.
- Scan your answer script(portrait) properly. If I can't read the text then I can't grade it.

**Total Time:** 40 minutes

**Maximum Marks:** 20

**Question # 1: Graph theory, Combinatorics and Trees**

**[5x4=20]**

(i) ABC company hires five employees Ali, Bilal, Danish, Erum and Farhan and they have four different job posts (Business Analyst, PHP Developer, JavaScript Developer and SQA Engineer. Ali can do PHP developer job or JavaScript Developer job, Bilal can do Business Analyst job or SQA Engineer job, Danish can do JavaScript Developer job or SQA Engineer, Erum can do Business Analyst job or JavaScript Developer job and Farhan can do Business Analyst job or PHP Developer job or JavaScript Developer job. Which type of graph (write name) you can plot representing this situation, and draw this graph?

**Scenario:**

Suppose that a popular company launches "Nothing is like 127.0.0.1" for both men and women. Women T-shirts come in four different sizes: M, L, XL, and XXL. Each size comes in four colors (white, red, green, and black), except XL, which comes only in red, green, and black, and XXL, which comes only in green and black. Men T-shirts come in five different sizes: S, M, L, XL, and XXL. Each size comes in three colors (white, green, and black), except XL and XXL, which comes only in white and black.

(ii) Use a tree diagram to determine what is the minimum number of T-shirts that the shop needs to stock to have one of each size and color available for both men and women?

(iii) Consider the tree obtained in part (ii).

Show how many internal vertices and leaves the tree has? Determine the height of the tree?

(iv) Consider the tree obtained in part (ii).

(a) Determine whether it is a Full m-ary tree or not? Give reason.

(b) Determine whether it is a Balanced m-ary tree or not? Give reason.

(v) Show the Preorder and Postorder traversal of the tree obtained in part (ii).

**BEST OF LUCK 😊**