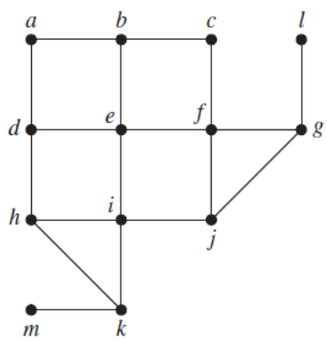
University of Dhaka
Institute of Information Technology
Bachelor of Science in Software Engineering
Final Examination, 2020
CSE102: Discrete Mathematics
Marks: 30 Time: 1 Hour 15 Mins

Professionalism	Excellence	Respect

Answer all the questions. The weight of each question is mentioned at the right side. When answering a question, please answer all the subsections of it at once

1.		Prove that every amount of postage of 12 cents or more can be formed using just 4-cent and 5-cent stamps.	**6**
2.	i)	Suppose that there are 9 faculty members in the mathematics department and 11 in the computer science department. How many ways are there to select a committee to develop a discrete mathematics course at a school if the committee is to consist of three faculty members from the mathematics department and four from the computer science department?	**3**
	ii)	What is the minimum number of students required to be sure that at least 9 students were born in the same month?	**3**
3.	i)	What is the composite of the relations R and S, where R is the relation from {1, 2, 3} to {1, 2, 3, 4} with R = {(1, 1), (1, 4), (2, 3), (3, 1), (3, 4)} and S is the relation from {1, 2, 3, 4} to {0, 1, 2} with S = {(1, 0), (2, 0), (3, 1), (3, 2), (4, 1)}?	**3**
	ii)	How many edges are there in a graph with 8 vertices each of degree five?	**3**
4.	i)	Use Huffman coding to encode these symbols with given frequencies: a: 0.20, b: 0.10, c: 0.15, d: 0.25, e: 0.30. What is the average number of bits required to encode a character?	**3**
	ii)	ii. Use breadth-first search, starting from node "**e**", to find a spanning tree for the graph given below. Show the steps with graphs, no text is required to answer this question. 	**3**
5.		Devise a recursive algorithm for computing b^n ***mod*** m, where b, n, and m are integers with $m \geq 2$, $n \geq 0$, and $1 \leq b < m$.	**6**
		Best of Luck!!!	