**Jatiya Kabi Nazrul Islam University**

**Dept. of Computer Science and Engineering**

**B.Sc. (Engg.) 1st Year 1st Semester Final Examination – 2023**

**Course Code & Title: 06131103 (Discrete Mathematics)**

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| **Time: 3 Hours** | **Marks: 5×12=60** |

**[Answer any 5 questions from the following]**

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| 1 |  | What is subset and duality of a set? Give proper example of these. | 4 |
|  |  | What do you mean by partition of a set? Find all partitions of set S = {1,2,3}. | 4 |
|  |  | Define finite set and infinite set. | 2 |
|  |  | Show that A = {2,3,4,5} is not a subset of B = {x: x N, x is even} | 2 |
|  |  |  |  |
| 2 |  | What is the use of relation in database? | 2 |
|  |  | Let *M* be the relation {(1,2), (1,3), (2,3), (2,4), (3,1)} and *N* be the relation {(2,1), (3,1), (3,2), (4,2)}. Find *M°N*. | 4 |
|  |  | Determine (*p* and [(*pq*)( *p*)] are logically equivalent or not. | 6 |
|  |  |  |  |
| 3 |  | Discuss about different types of relations with proper example. | 5 |
|  |  | Write the negation of each statement as simply as possible: | 3 |
|  |  | 1. If she works, she will earn money. |  |
|  |  | 1. He swims if and only if the water is warm. |  |
|  |  | 1. If it snows, then they do not drive the car. |  |
|  |  | Define function, composition of function, one-to-one and onto function. | 4 |
|  |  |  |  |
| 4 |  | Differentiate between precedence graph and undirected graph. | 2 |
|  |  | Show that *k5* is a non-planer graph. | 4 |
|  |  | Find out the chromatic number of the following graph: | 6 |
|  |  |  |  |
|  |  | Also assign color to each of the vertex. |  |
| 5 |  | What do you mean by complete binary tress? | 2 |
|  |  | Construct a binary search tree for the following data sequence: 15,10,2,17,8,9,5,6,3,7,4,6 and 20. Then delete the data elements 5 and 20 and draw the resulttant tree. | 5 |
|  |  | What is the result of the following postfix expression? 4, 2, \*, 1,, 8, 3, -, 8, 4, 1, \*, -. Also draw an ordered rooted tree from the given expression. | 5 |