

The Open University of Sri Lanka
 B.Sc/ B.Ed Degree Programme
 Applied Mathematics – Level 05
 ADU5308 – Graph Theory
 CAT 2 – No Book Test - 2023/2024



DURATION: ONE HOUR

Date: 02.02.2024

Time: 10.30 a.m. – 11.30 a.m.

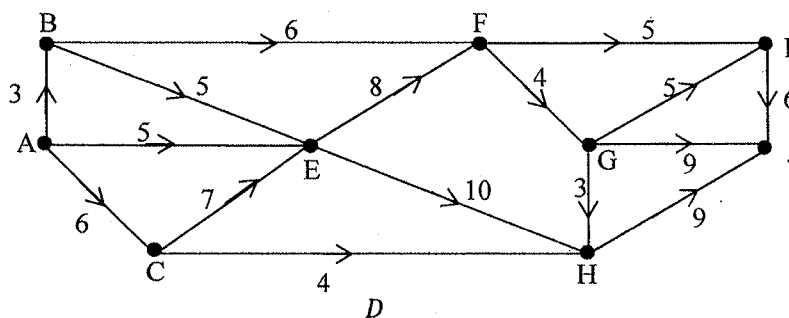
ANSWER ALL QUESTIONS.

1.

- Define a *Self-dual graph* and provide an illustrative example to demonstrate the concept. [20 marks]
- Prove that the *Peterson graph* is non-planar using *Kuratowski's Theorem*. [15 marks]
- Is $K_{1,3}$ a *Line graph*? Justify your answer. [15 marks]

2.

- Let D be a digraph which represents a construction of a complete apartment, where A and J respectively represent the beginning and the completion of the construction.



Using the critical path problem technique, find the minimum time required to build the apartment completely. [25 marks]

- b) Suppose there are five students; Harry, Dana, Luis, Joe, and Nancy in a class, and they are taking some Mathematics courses $M_1, M_2, M_3, M_4, M_5,$ and M_6 . It is given that, Harry is taking $M_1, M_2, M_5,$ and M_6 ; Dana is taking $M_3, M_4, M_5,$ and M_6 ; Luis is taking M_1, M_5 and M_6 ; Joe is taking $M_1, M_3,$ and M_5 ; and Nancy is taking $M_2, M_4,$ and M_6 . The examiners wish to schedule a final examination for each course in such a way that no student has the conflict of two finals scheduled for the same time period. What is the minimum number of time periods required? Construct the graph and solve the problem. [25 marks]
