ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)

ORGANISATION OF ISLAMIC COOPERATION (OIC)

Department of Computer Science and Engineering (CSE)

QUIZ 1 **SUMMER SEMESTER, 2021-2022**

DURATION: 10 DAYS **FULL MARKS: 15**

CSE 4803: Graph Theory

Answer **1 (one)** question. Marks of each question and corresponding CO and PO are written in the right margin with brackets. The symbols have their usual meanings.

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1. Determine the relationship between $\alpha(G)$ and $\beta(G)$. 15 (CO1) (PO1)

2. Determine the relationship between $\alpha(G)$ and $\beta'(G)$. 15 (CO1) (PO1)

3. Determine the relationship between $\alpha'(G)$ and $\beta(G)$. 15 (CO1) (PO1)

4. Determine the relationship between $\alpha'(G)$ and $\beta'(G)$. 15 (CO1) (PO1)

5. Show that for a bipartite graph G, the cardinality of the maximum matching is equal to the cardinality of its minimum vertex cover. 15 (CO1) (PO1)

6. Show that a bipartite graph G has a matching of A if and only if G satisfies Hall's condition: for all $S \subseteq A$, $|N(S)| \geq |S|$. 15 (CO1) (PO1)

7. Show that every k-regular $(k \geq 1)$ bipartite graph has a perfect matching. 15 (CO1) (PO1)

8. Show that any $2k$-regular graph has a cycle cover. 15 (CO1) (PO1)

9. Show that a graph G has a perfect matching if and only if G satisfies Tutte's condition: for all $S \subseteq V(G)$, $q(G - S) \leq |S|$. 15 (CO1) (PO1)

10. Show that every bridgeless cubic graph has a perfect matching. 15 (CO1) (PO1)