MATHEMATICAL TRIPOS PART II (2004–05)

Graph Theory - Sample exam questions **A.G. Thomason**

Most examination questions from the previous II(A) Graph Theory course are suitable for the present course, as are the majority of questions from the previous II(B) Combinatorics course. The style of this year's questions will be closer to that of II(B) than that of II(A).

The II(A) Graph Theory course included the Max-Flow-Min-Cut theorem, which is not in the present course. The II(B) Combinatorics course included material on finite sets which is not in the present course.

Planar graphs were part of the II(A) Graph Theory course but not of the II(B) Combinatorics course. Ramsey Theory was part of the II(B) Combinatorics course but not of the II(A) Graph Theory course.

The Erdős-Stone Theorem, probabilistic methods, and eigenvalue methods, are new to the present Graph Theory course.

The following is a list of previous exam questions (or, alternatively, exercises from the present course) that are sufficient to give the flavour of exam questions and to cover the material in the course:

Introduction and Basic theorems (trees, bipartite graphs, planarity etc.)

IIA-2004p4-9F, IIA-2003p2-8F, IIA-2002p1-8H, IIA-2001p1-8A, IIB-2000p1-5A

Hall's theorem and Menger's theorem

IIA-2004p1-8F, IIA-2002p4-9H, IIB-2004p1-5F

Extremal graph theory (Cycles, Turán, Zarankiewicz)

IIA-2004p1-8F, IIA-2003p1-8F, IIA-2001p4-9A, IIA-2000p1-8A, IIB-2003p1-5F, IIB-2002p1-5H, IIB-2001p4-1A

Extremal graph theory (Erdős-stone)

Problem Sheet 2, exercises 25 and 26.

Colouring

IIA-2004p2-8F, IIA-2003p1-8F, IIA-2003p4-9F, IIA-2002p2-8H, IIA-2001p2-8A, IIA-2000p4-9A

Ramsey Theory

IIB-2004p4-1F, IIB-2003p2-5F, IIB-2002p4-1H, IIB-2001p2-5A

Probabilistic Methods

IIA-2001p1-8A, Problem Sheet 4, exercises 60, 61, 62.

Eigenvalue Methods

Problem Sheet 4, exercises 64, 65.