THE EXAM- SCHEDULING PROBLEM

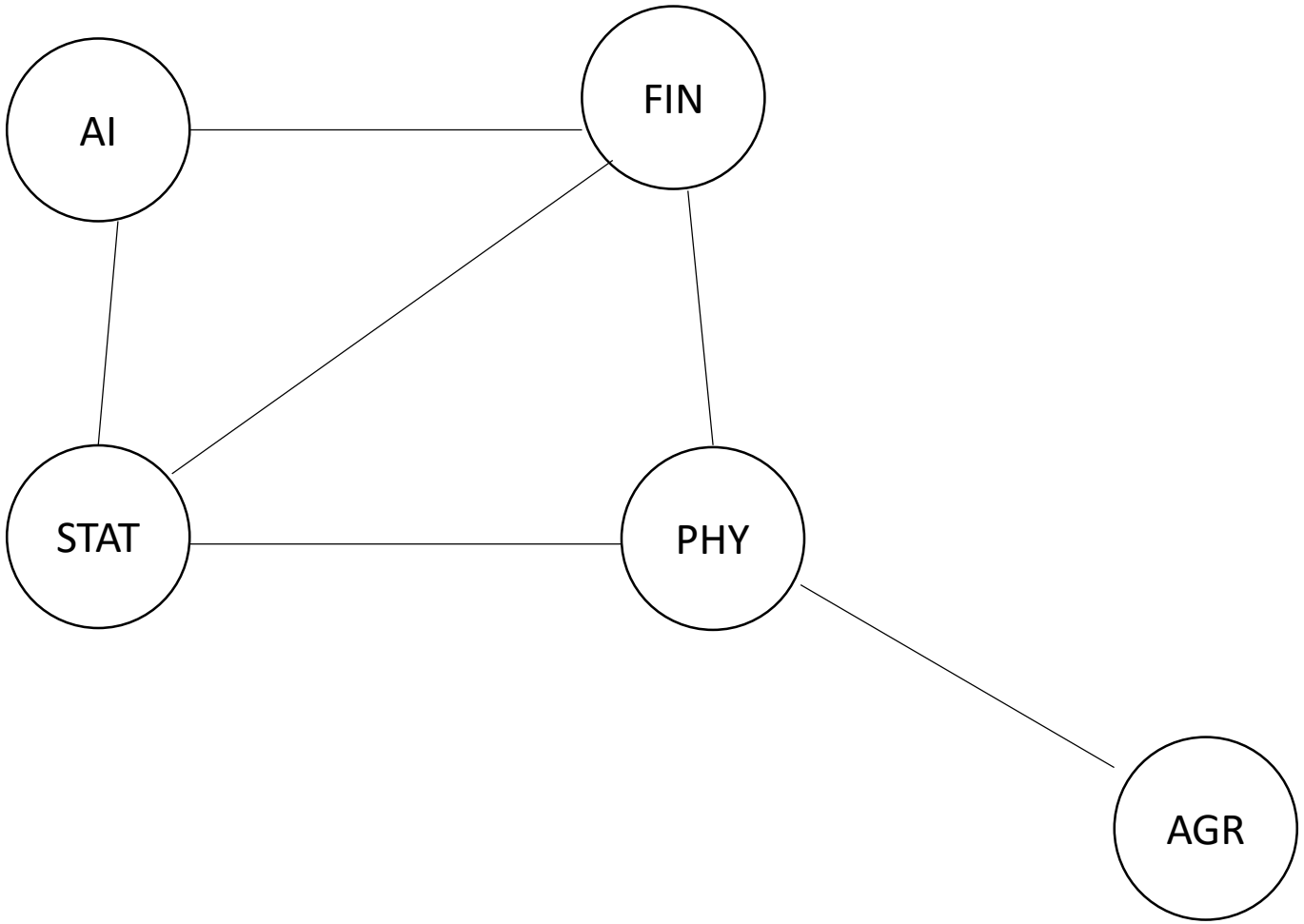
EXAMS	**EXAM - SLOTS**
AI	3:00 pm – 5:00 pm
FINANCE	5:00 pm – 7:00 pm
STATISTICS	7:00 pm – 9:00 pm
PHYSICS	9:00 pm – 11:00 pm
AGRI. ENGG	11:00 pm – 1:00 am

Student – Overlap Matrix

	AI	FIN	STAT	AGR	PHY
AI	-	Yes	Yes	No	No
FIN	Yes	-	Yes	No	Yes
STAT	Yes	Yes	-	No	Yes
AGR	No	No	No	-	Yes
PHY	No	Yes	Yes	Yes	-

Objective

- All exams must be held.
- No student should miss an exam.
- The exams must be wrapped up ASAP.


AI
FIN
STAT
PHY
AGR

Colour – Slot Mapping

- Imagine 5 distinct colours – {Col.1 , Col.2, Col.3, Col.4, Col.5}
- Each colour is associated with one unique slot.

EXAM - SLOTS	Colour
3:00 pm – 5:00 pm	COL.1
5:00 pm – 7:00 pm	COL.2
7:00 pm – 9:00 pm	COL.3
9:00 pm – 11:00 pm	COL.4
11:00 pm – 1:00 am	COL.5

Graph – Colouring Problem

- Imagine 5 distinct colours – {Col.1 , Col.2, Col.3, Col.4, Col.5}
- Each colour is associated with one unique slot.
- Assign a colour to each node.
- No two adjacent nodes should have the same colour.
- Colour all nodes using minimum number of colours.

Chromatic Number

- ***GT Problem***: Given a graph G and ‘k’ colours assign a colour to each node such that no two adjacent nodes have the same colour.

- The minimum value of ‘k’ for which such a colouring scheme exists for a graph G is called the **chromatic number** of graph G

Basic Colouring Algorithm

Given a graph G

i. Order the *vertices* in some order: v_1 , v_2, v_3, v_4…. v_n

ii. Order the *colours* in some order: COL_1 , COL_2, COL_3, …. COL_n

iii. For $i = 1,2,3 \ldots\ldots n$

Assign the lowest legal colour to v_i

Theorem

If every node is a graph G has degree ≤ d, the basic algorithm will require AT MOST (d+1) colours, no matter what the ordering is.