Networks and Flows on Graphs[1]

Final Exam

Duration of the exam : 1h30
No documents are allowed
Only *non-programmable* pocket calculators are allowed
Exercises can be done independently.

Exercise 1.

Exploiting a newly found mineral deposit involves the execution of hereby listed tasks.
Table features each tasks identifier, description, duration and prior tasks.

Label of task	Task description	Time (in weeks)	Prior Tasks
A	Obtainging construction permit	120	–
B	Setting up a 6 km track	180	A
C	Installation of two drill machines	3	B
D	Setting temporary offices for mapping team and lodging for drilling one	30	B
E	Tarmac the track	60	B
F	Water conveyance	90	D
G	Probing phase	240	C, D
H	Drilling and equipping three wells	180	E, F, G
I	Installing exploiting equipment down the wells	30	J, H
J	Setting up pemanent offices and lodgings for engineers and workers	240	E, F, G
K	Tracing and layout of galleries	360	J, H
L	Setting up washing system	240	J, H

1. Draw the MPM (Meta Potential Model) graph of this project planning problem.

2. Using relevant algorithms, give earliest scheduling dates.

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- What is the minimum amount of time the project needs to be done?

- What are the critical tasks?

3. Using relevant algorithms, give latest scheduling dates.

- What is the total margin of the project? Compute free margins of non-critical tasks?

Exercise 2.
Using Floyd-Warshall's algorithm, compute all minimal paths between any two pairs of vertices of the following graph. Could we look for all maximal paths between any such pairs?