UNIVERSITY OF TORONTO

FACULTY OF APPLIED SCIENCE AND ENGINEERING

FINAL EXAMINATION, DECEMBER 21, 2001

MIE562F SCHEDULING
Exam Type: A
All non-programmable calculators are allowed

INSTRUCTOR: I. B. TURKSEN

Final examination is two hours from 9:30-12:00
Be explicit and provide all necessary explanations

pts. **Question 1.**

(15) Consider the $1/r_j$, *prmp*/Lmax problem with the following data,

Jobs	1	2	3	4	5	6
p_j	7	6	4	5	4	4
d_j	28	18	30	14	16	12
r_j	0	8	7	8	5	0

Determine the optimum schedule and the value of optimal L_{max}.

Question 2

(15) Consider $F_4/prmu/C_{max}$ with the following jobs

Jobs	*1*	*2*	*3*	*4*
p_{1j}	12	13	13	10
p_{2j}	8	10	9	8
p_{3j}	8	5	7	4
p_{4j}	15	5	10	25

Determine the optimal sequence and estimate the value of C_{max}.

Question 3

(15) Consider the following 5 job 3 machine *proportionate* flow shop problem ($F_3/p_{ij}=p_j/\Sigma U_j$). Find the optimal schedule that minimizes the number of tardy jobs and calculate the optimal value.

Jobs	1	2	3	4	5	6
p_j	7	6	4	5	4	4
d_j	29	33	35	32	31	27

Question 4

(15) Consider the following instance of O_4//Cmax problem.

Jobs	*1*	*2*	*3*	*4*
p_{1j}	5	5	13	0
p_{2j}	5	7	3	8
p_{3j}	12	5	7	0
p_{4j}	0	5	0	15

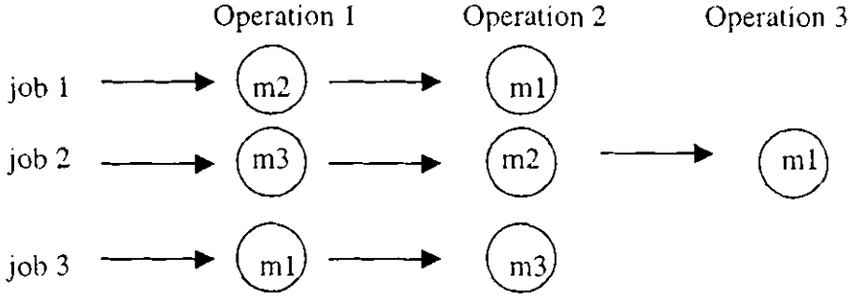
Apply the *longest total remaining processing on other machine first* (LTRPOM) rule. Consider at time 0 first machine 1, then machine 2, followed by machines 3 and 4. Compute the makespan.

Question 5.

(20) Consider the job shop problem with the following processing times

jobs	Operation 1	Operation 2	Operation 3
1	5	3	*
2	2	5	3
3	4	3	*

and with the routing data as



Apply the branch and bound algorithm for two levels. Branch for all possible active nodes and calculate the bounds.

Question 6

(20) Consider the following 2 job 5 machine job shop problem.

J_1 : A B C D E
J_2 : E C A D B

a) How many possible programs (schedules) are there?
b) Show which ones are in feasible and eliminate all infeasible schedules.
c) Eliminate the non-optimal programs.
d) Determine the optimal schedule.

Note: You can use the following optimality rules:

Rule 1	X....Y	Y...	xy
Rule 2	X...Y...	...XY...	x`y
Rule 3	...X...Y	...XY...	x`y
Rule 4	...XY...	X...Y...	xy`