

Planning of Factories and Production Processes PRE5323

Final May 2013, 3rd Year at Production Engineering and Mechanical Design Department.

Please solve the next problems. Time: 3 hrs. Total marks:110.

1-[40 marks]-Consider the problem data below to compare two aggregate production plans—*level aggregate plan* and *chase aggregate plan*.

Capacity Data		Cost Data		Demand (units)	
Beginning workforce (employees)	18	Regular-time cost/hour	\$15.0	November	3000
Beginning inventory (units)	2500	Overtime cost/hour	\$22.0	December	6000
Production standard/unit (hours)	0.64	Hiring cost/employee	\$500.0	January	2000
Regular-time available/period (hours)	160	Firing cost/employee	\$750.0	February	8500
Overtime available/period (hours)	20	holding cost/unit/period	\$5.0	March	4000
		Shortage cost/unit/period	\$7.5	April	5500
		Material cost/unit	\$30.0	May	1500

2-[30 marks]-Sales schedule of a manufacturer over past 20 months is given below. (a) Develop a forecast for month 21 using the trend equation: $y = a^{(b+c/x)}$. (b) What is the efficiency of this trend?

Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Sales	23	156	330	482	1209	1756	2000	2512	2366	2942	2872	2937	3136	3241	3149	3524	3542	3312	3547	3376

3-[20 marks]-The time to failure of a pump is a uniformly distributed random variable within the time interval [0, 5,000] operating hrs. This pump costs \$2,000 for purchase, \$200 for installation and \$800 due to the consequences of each failure. Find the minimum maintenance cost based on the *constant interval replacement* model.

4-[20 marks]-Computronics is a manufacturer of calculators, currently producing 300 units per week. One component for every calculator is an LCD, which the company purchases from a supplier for \$1 per LCD. The placement of each order is estimated to require 1 hour of clerical time, with a direct cost of \$15 per hour plus overhead costs of another \$5 per hour. A rough estimate has been made that the annual cost of capital tied up in Computronics' inventory is 15 percent of the value of the inventory. Other costs associated with storing and protecting the LCDs in inventory amount to \$0.05 per LCD per year. What should be the optimal ordering policy and how much it does cost?

My best wishes...Prof. Dr. Hassan Soltan

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