Faculty of Engineering

Prince of Songkhla University

Midterm Examination : Semester I **Academic Year : 2004**

Date : August 8, 2004. **Time :** 13.30-16.30

Subject : 225-353 Production Planning and Control **Room :** A401

Instructions :

1. There are 4 questions 100 points.
2. Attempt all questions.
3. A sheet of paper note at size A4, a dictionary and a calculator are allowed.
4. Borrowing things from other students is prohibited.

Problem no.	Full score	Score
1	30	
2	20	
3	30	
4	20	
Total	**100**	

Asso. Prof. Sunchai Klinpikul

Instructor

ทุจริตในการสอบ โทษขั้นต่ำปรับตกในรายวิชานั้น
และพักการเรียน 1 ภาคการศึกษา โทษสูงสุด ให้ออก

1. **A past two years sales of power mixers are as follows :**

Year	Jan-Mar	Apr-June	July-Sept	Oct-Dec
2002	200	150	110	70
2003	250	140	120	80

a. Forecast the demand of power mixers in the year 2004 using Winter's linear and Seasonal Forecasting technique and use $\alpha = 0.25$, $\gamma = 0.30$ and $\beta = 0.05$. **(20 points)**

b. Compute the accuracy of the forecast and control limit at 5% significant level. **(10 points)**

2. Forecast the demand of power mixers from problem no. 1 using decomposition method. (20 points)

3. A manufacturer producing an effective microorganism (EM) for improving water quality for shrimp cultivation had forecast the demand in Southern Thailand in 2005 as follows.

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Demand (Gallon)	2,000	1,100	2,200	3,000	1,700	1,200	1,800	3,200	2,000	1,200	1,900	1,800

According to the forecast demand, the company decided to build a warehouse in Songkla with the maximum storage capacity of 20,000 gallons at a capital investment of 500,000 Baht (use 20 years straight line depreciation). Selling price of the EM was 350 Baht per gallon. The order cost including transportation was 2,000 Baht per order. The company had to pay an insurance at 3,000 Baht per month. Material handling and management costs in the warehouse was estimated at 2,000 Baht per month. Interest rate was 6% per year.

a. Determine the proper amount of EM to be delivered to Songkla warehouse per order at minimum total inventory cost. (20 points)

b. Suppose the average delivery time was 8 days, calculate proper safety stock and reorder point using square root of usage during lead time. (20 points)

4. A job shop factory produces the automobile spare parts with the maximum production rate of 4,000 pieces per month. The price of the spare part was 600 Baht per piece. Few months later the demand for this spare parts was decreased to 70% of the maximum production rate.

One day another motor bicycle supplier wanted to hire this factory to produce motor bicycle spare parts which is quite similar to the automobile spare part at 1,000 pieces, delivery time 1 month at the price of 400 Baht per piece.

Cost analysis of the factory based on the production capacity of 2,800 pieces per month was :

ITEM		Baht/Piece
Raw material		200
Workers (piece rate)		50
Administrative wages		120
Depreciation		60
Packaging		70
	Total	500

Should the factory produce the motor bicycle spare parts ? (20 points)

ตารางที่ ผ.2 จุดร้อยละของการแจกแจง t

ν \ α	.40	.25	.10	.05	.025	.01	.005	.0025	.001	.0005
1	.325	1.000	3.078	6.314	12.706	31.821	63.657	127.32	318.31	636.62
2	.289	.816	1.886	2.920	4.303	6.965	9.925	14.089	23.326	31.598
3	.277	.765	1.638	2.353	3.182	4.541	5.841	7.453	10.213	12.924
4	.271	.741	1.533	2.132	2.776	3.747	4.604	5.598	7.173	8.610
5	.267	.727	1.476	2.015	2.571	3.365	4.032	4.773	5.893	6.869
6	.265	.718	1.440	1.943	2.447	3.143	3.707	4.317	5.208	5.959
7	.263	.711	1.415	1.895	2.365	2.998	3.499	4.029	4.785	5.408
8	.262	.706	1.397	1.860	2.306	2.896	3.355	3.833	4.501	5.041
9	.261	.703	1.383	1.833	2.262	2.821	3.250	3.690	4.297	4.781
10	.260	.700	1.372	1.812	2.228	2.764	3.169	3.581	4.144	4.587
11	.260	.697	1.363	1.796	2.201	2.718	3.106	3.497	4.025	4.437
12	.259	.695	1.356	1.782	2.179	2.681	3.055	3.428	3.930	4.318
13	.259	.694	1.350	1.771	2.160	2.650	3.012	3.372	3.852	4.221
14	.258	.692	1.345	1.761	2.145	2.624	2.977	3.326	3.787	4.140
15	.258	.691	1.341	1.753	2.131	2.602	2.947	3.286	3.733	4.073
16	.258	.690	1.337	1.746	2.120	2.583	2.921	3.252	3.686	4.015
17	.257	.689	1.333	1.740	2.110	2.567	2.898	3.222	3.646	3.965
18	.257	.688	1.330	1.734	2.101	2.552	2.878	3.197	3.610	3.922
19	.257	.688	1.328	1.729	2.093	2.539	2.861	3.174	3.579	3.883
20	.257	.687	1.325	1.725	2.086	2.528	2.845	3.153	3.552	3.850
21	.257	.686	1.323	1.721	2.080	2.518	2.831	3.135	3.527	3.819
22	.256	.686	1.321	1.717	2.074	2.508	2.819	3.119	3.505	3.792
23	.256	.685	1.319	1.714	2.069	2.500	2.807	3.104	3.485	3.767
24	.256	.685	1.318	1.711	2.064	2.492	2.797	3.091	3.467	3.745
25	.256	.684	1.316	1.708	2.060	2.485	2.787	3.078	3.450	3.725
26	.256	.684	1.315	1.706	2.056	2.479	2.779	3.067	3.435	3.707
27	.256	.684	1.314	1.703	2.052	2.473	2.771	3.057	3.421	3.690
28	.256	.683	1.313	1.701	2.048	2.467	2.763	3.047	3.408	3.674
29	.256	.683	1.311	1.699	2.045	2.462	2.756	3.038	3.396	3.659
30	.256	.683	1.310	1.697	2.042	2.457	2.750	3.030	3.385	3.646
40	.255	.681	1.303	1.684	2.021	2.423	2.704	2.971	3.307	3.551
60	.254	.679	1.296	1.671	2.000	2.390	2.660	2.915	3.232	3.460
120	.254	.677	1.289	1.658	1.980	2.358	2.617	2.860	3.160	3.373
∞	.253	.674	1.282	1.645	1.960	2.326	2.576	2.807	3.090	3.291