

Indian Statistical Institute, Bangalore
M.S (QMS) First Year
Second Semester – Industrial Experimentation

Final Exam Maximum Marks: 50 Duration: 3hrs Date: 06th May 2015

1. Write short note on the following:- [15]
 - a) Mixture design
 - b) Response surface methodology
 - c) Signal-to-noise ratio

2. Explain the concept of nested design. Write down the model and ANOVA table for two stage nested design. [10]

3. An experimenter is interested in studying the effect of four factors. A, B, C and D each at two levels and interactions AB and CD. Prepare the design layout of the experimentation using suitable Orthogonal Array. [10]

4. In order to test the effect of four assembly methods (A, B, C, D) on the assembly time, the following Latin Square design was prepared. Analyse the data and make appropriate conclusions. [10]

Order of Assembly	Operator			
	1	2	3	4
1	C = 10	D = 14	A = 7	B = 8
2	B = 7	C = 18	D = 11	A = 8
3	A = 5	B = 10	C = 11	D = 9
4	D = 10	A = 10	B = 12	C = 14

5. An experiment was conducted with four factors A, B, C and D each at two levels using the Orthogonal Array $L_8 (2^7)$ with 2 replicates. The data obtained were as follows:
[15]

Exp. No.	A Column 1	B Column 2	C Column 4	D Column 7	Response	
					1	2
1	1	1	1	1	8.5	8.8
2	1	1	2	2	9.0	8.7
3	1	2	1	2	9.7	10.0
4	1	2	2	1	8.6	8.4
5	2	1	1	2	7.3	7.2
6	2	1	2	1	6.5	6.2
7	2	2	1	1	7.1	7.1
8	2	2	2	2	7.9	8.2

- a) Carryout ANOVA and test the significance of main effect and all possible interactions.
- b) Draw the response curve and identify the optimum levels, by considering higher the better type response.
- c) Predict the average response at the optimum combination.