

X

NPTEL

reviewer1@nptel.iitm.ac.in ▼

Courses » Design and Analysis of Experiments

Announcements Course Ask a Question Progress Mentor

Unit 11 - Week 10

Course outline

How to access the portal

Week 1

Week 2

Week 3

Week 4

Week 5

Week 6

Week 7

Week 8

Week 9

Week 10

● Lecture 48 :
Alias Structure in Fractional factorial design: Regression Approach

● Lecture 49 :
General 2^{k-p} Fractional Factorial Design

○ Lecture 50 :
Fractional factorial design: Fold-over Design

○ Lecture 51 :
Plackett-Burman Designs

○ Feedback for week 10

○ Quiz :
Week_10_Assignment_1

Week_10_Assignment_10

The due date for submitting this assignment has passed. **Due on 2018-04-04, 23:59 IST.**

Submitted assignment

Questions 1- 5 are based on the following case:

Five factors in a manufacturing process for an integrated circuit were investigated in a 2^{5-1} design with the objective of improving the process yield. The five factors were A = aperture setting (small, large), B = exposure time (20 percent below nominal, 20 percent above nominal), C = develop time (30 and 45 sec), D = mask dimension (small, large), and E = etch time (14.5 and 15.5 min). The construction of the design 2^{5-1} is shown in Table below. Notice that the design was constructed by writing down the basic design having 16 runs (a 2^4 design in A, B, C, and D), selecting ABCDE as the generator, and then setting the levels of the fifth factor E = ABCD.

Run	Basic Design				E = ABCD	Treatment Combination	Yield
	A	B	C	D			
1	-	-	-	-	+	e	8
2	+	-	-	-	-	a	9
3	-	+	-	-	-	b	34
4	+	+	-	-	+	abe	52
5	-	-	+	-	-	c	16
6	+	-	+	-	+	ace	22
7	-	+	+	-	+	bce	45
8	+	+	+	-	-	abc	60
9	-	-	-	+	-	d	6
10	+	-	-	+	+	ade	10
11	-	+	-	+	+	bde	30
12	+	+	-	+	-	abd	50
13	-	-	+	+	+	cde	15
14	+	-	+	+	-	acd	21
15	-	+	+	+	-	bcd	44
16	+	+	+	+	+	abcde	63

1) The resolution of the design is:

2 points

- (i) III
 (ii) IV
 (iii) V
 (iv) None of these

No, the answer is incorrect.

Score: 0

Accepted Answers:

(iii) V

2) The estimated effect of B is:

4 points

- (i) 11.125

Week 11

Week 12

DOWNLOAD
VIDEOS

- (ii) 30.875
 (iii) 33.875
 (iv) 35.545

No, the answer is incorrect.

Score: 0

Accepted Answers:

(iii) 33.875

3) The sum of squares of AB is:

2 points

- (i) 189.063
 (ii) 188.063
 (iii) 198.063
 (iv) 189.603

No, the answer is incorrect.

Score: 0

Accepted Answers:

(i) 189.063

4) The significant effects are:

4 points

- (i) A, B, and AB
 (ii) A, C, and AC
 (iii) A, B, and C
 (iv) A, B, C, and AB

No, the answer is incorrect.

Score: 0

Accepted Answers:

(iv) A, B, C, and AB

5) The regression coefficients of A, B, CD are:

4 points

- (i) 5.56, 16.01, and 0.44, respectively
 (ii) 5.56, 16.94, and -5.44, respectively
 (iii) 5.56, 16.94, and 0.44, respectively
 (iv) 5.56, 16.94, and 5.44, respectively

No, the answer is incorrect.

Score: 0

Accepted Answers:

(iii) 5.56, 16.94, and 0.44, respectively

6) For a 2^{3-1} design with defining relation $I=ABC$, the experimenter wants to consider main effects and two-factor interaction effects; the alias matrix will be

2 points

$$\begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 1 \\ 0 & 1 & 0 \\ 1 & 0 & 0 \end{bmatrix}$$

$$\begin{bmatrix} 0 & 0 & 0 \\ 1 & 0 & 1 \\ 1 & 1 & 0 \\ 1 & 0 & 0 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & 0 & 1 \\ 0 & 1 & 0 \\ 1 & 0 & 0 \end{bmatrix}$$

$$\begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 1 \\ 0 & 1 & 0 \\ 1 & 0 & 1 \end{bmatrix}$$

No, the answer is incorrect.

Score: 0

Accepted Answers:

$$\begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 1 \\ 0 & 1 & 0 \\ 1 & 0 & 0 \end{bmatrix}$$

7) Plackett-Burman designs can be used for N number of runs. The value of *2 points* N may be:

- N=12
 N=24
 N=20
 All of these.

No, the answer is incorrect.

Score: 0

Accepted Answers:

All of these.

Previous Page

End

© 2014 NPTEL - Privacy & Terms - Honor Code - FAQs -



A project of



In association with



Funded by

Government of India
Ministry of Human Resource Development

Powered by

