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Unit 11 - Week 10

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.

	Basic Design						
Run	*A*	*B*	*C*	*D*	*E = ABCD*	Treatment Combination	Yield
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

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(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 N may be:** *2 points*

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

No, the answer is incorrect.
Score: 0

Accepted Answers:
All of these.

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