

Unit 11 - Week 9

Course outline

How does an NPTEL online course work?

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Week 9

- Lecture 43 : Factorial Design: Minitab Application
- Lecture 44 : Fractional Factorial Design: Minitab Application
- Lecture 45 : Taguchi Method: Key Concepts
- Lecture 46 : Taguchi Method: Illustrative Application
- Quiz : Assignment 9**
- Week 9 Feedback Form

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Assignment Detailed Solution

Text Transcripts

Assignment 9

The due date for submitting this assignment has passed. **Due on 2020-04-01, 23:59 IST.**
 As per our records you have not submitted this assignment.

1) How many runs per replication are possible in an experiment with four factors and three levels? 1 point

(Hint: Assume complete factorial experiment)

- 9
- 81
- 125
- 27

- a.
 b.
 c.
 d.

No, the answer is incorrect.
 Score: 0

Accepted Answers:
 b.

2) In a 2^5 design, how many three factor interactions are possible 1 point

- 63
- 6
- 10
- 32

- a.
 b.
 c.
 d.

No, the answer is incorrect.
 Score: 0

Accepted Answers:
 c.

3) In a 2^7 design how many degrees of freedom correspond to two-factor interaction 1 point

- 21
- 5
- 32
- 10

- a.
 b.
 c.
 d.

No, the answer is incorrect.
 Score: 0

Accepted Answers:
 a.

4) Match the following 1 point

Type of Variation	Definition
A. The sparsity of effects principle	1. It is possible to combine the runs of two (or more) fractional factorials to construct sequentially a larger design to estimate the factor effects and interactions of interest.
B. The projection property	2. When there are several variables, the system or process is likely to be driven primarily by some of the main effects or low-order interactions.
C. Sequential experimentation	3. Fractional factorial designs can be projected into stronger designs in subset of significant factors.

- A-3, B-1, C-2
- A-3, B-2, C-1
- A-2, B-3, C-1
- A-2, B-1, C-3

- a.
 b.
 c.
 d.

No, the answer is incorrect.
 Score: 0

Accepted Answers:
 c.

5) Consider an experiment with three factors A, B, C with two levels (“+” and “-”). Identify the alias structure of A (assume I=ABC). 1 point

- AB
- BC
- AC
- ABC

- a.
 b.
 c.
 d.

No, the answer is incorrect.
 Score: 0

Accepted Answers:
 b.

6) Consider an experiment with three factors A, B, C with two levels (“+” and “-”). Identify the alias structure of AB (assume I=ABC). 1 point

- ABC
- C
- B
- AC

- a.
 b.
 c.
 d.

No, the answer is incorrect.
 Score: 0

Accepted Answers:
 b.

7) In resolution IV designs 1 point

- Two-factor interactions are aliased with three-factor interactions
- Two-factor interactions are aliased with each other
- Main effects are aliased with two-factor interactions
- None of these

- a.
 b.
 c.
 d.

No, the answer is incorrect.
 Score: 0

Accepted Answers:
 b.

8) Theory can be proved by the experiments; but no path leads from experiment to the birth of a theory is the statement by 1 point

- Edwards Deming
- Joseph Juran
- Genichi Taguchi
- None of these

- a.
 b.
 c.
 d.

No, the answer is incorrect.
 Score: 0

Accepted Answers:
 d.

9) In product design phase, we can take the countermeasure against which of the source of noise 1 point

- Environmental variables
- Product deterioration
- Manufacturing variations
- All of these

- a.
 b.
 c.
 d.

No, the answer is incorrect.
 Score: 0

Accepted Answers:
 d.

10) According to Taguchi, the complexity is maximum at 1 point

- Tolerance design
- System design
- Parameter design
- All of these

- a.
 b.
 c.
 d.

No, the answer is incorrect.
 Score: 0

Accepted Answers:
 a.

11) Match the following 1 point

Hint: Here y is output value and m is the target of the process specification

Concept	The loss function
A. Larger is better	1. $L(y) = k(y - m)^2$
B. Smaller is better	2. $L(y) = ky^2$
C. Nominal is best	3. $L(y) = k \left[\frac{1}{y^2} \right]$

- A-3, B-2, C-1
- A-3, B-1, C-2
- A-2, B-3, C-1
- A-2, B-1, C-3

- a.
 b.
 c.
 d.

No, the answer is incorrect.
 Score: 0

Accepted Answers:
 a.

12) Design to the highest standards early in the process eliminates- 1 point

- Non-random errors
- Random errors

- a.
 b.

No, the answer is incorrect.
 Score: 0

Accepted Answers:
 a.

13) You can save more for your organization if you correct the production process at 1 point

- Design phase
- Service delivery phase
- Post service delivery phase
- All the phases consume equal amount of resources

- a.
 b.
 c.
 d.

No, the answer is incorrect.
 Score: 0

Accepted Answers:
 a.

14) A Company received an average of 10 complaints per month last year. In November they received 15 complaints (y). Management sets an acceptable level at 2 (tolerance). If it costs the company Rs.25.00 directly per complaint to correct the problems and the cost in lost sales is Rs.75.00 per complaint. Compute the total cost of quality in the month of November 1 point

Hint: use nominal is best concept

- Rs. 500
- Rs. 625
- Rs. 100
- Rs. 937.50

- a.
 b.
 c.
 d.

No, the answer is incorrect.
 Score: 0

Accepted Answers:
 b.

15) Signal-to-Noise ratio for “larger is better” is- 1 point

- $SN_I = -10 \log \left(\frac{1}{n} \sum_{i=1}^n \frac{1}{y_i^2} \right)$
- $SN_I = -10 \log \left(\frac{1}{n} \sum_{i=1}^n y_i^2 \right)$
- $SN_I = 10 \log \left(\frac{\bar{y}^2}{S^2} \right)$
- None of these

- a.
 b.
 c.
 d.

No, the answer is incorrect.
 Score: 0

Accepted Answers:
 a.