**SRM Institute of Science and Technology**

**College of Engineering and Technology**

**B.Tech - Mechanical Engineering**

**Academic Year: 2022-23 Even Semester: VI Mark: 25**

**Subject Code: 18MEO113T Title: Design of Experiments Duration: 50 min**

**Type of Test: CLAI/CLAII/CLAIII/CLAIV**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Part A Question** | **M** | **BL** | **CO** | **PO** | **PI** |
| 1 | A technique used to increase the precision of an experiment by breaking the investigation into homogeneous segments to control noise factors is called?  (A) Blocking  (B) Replication  (C) Randomization  (D) Strategic Design  **ANS: (A) Blocking** | 1 | 1 | 1 | 2.2 | 2.2.2 |
| 2 | In an interactions graph, there is a significant interaction between the process parameters, which means the lines in the interaction plot would be \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.  (A) Crosses  (B) Parallel  (C) Almost Parallel  (D) Non-Parallel  **ANS: (D) Non-Parallel** | 1 | 2 | 1 | 4.1 | 4.1.2 |
| 3 | An industrial experiment is performed to capture input variables' changes so that the output variables are always near the desired nominal value. This phenomenon is known as \_\_\_\_\_\_\_\_\_\_\_\_\_.  (A) Process Characterization  (B) Process Control  (C) Process Optimization  (D) Robust Design  **ANS: (B) Process Control** | 1 | 1 | 1 | 1.3 | 1.3.1 |
| 4 | Which is not a Conventional Experimental strategy from the following?  (A) Several factors, one at a time  (B) One factor at a time  (C) Best guess approach  (D) Several factors, all at the same time.  **ANS: (C) Best guess approach** | 1 | 1 | 1 | 3.2 | 3.2.1 |
| 5 | The need for Strategy Design is to obtain \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ results at minimum cost.  (A) Better  (B) Unambiguous  (C) Efficient  (D) Simple  **ANS: (B) Unambiguous** | 1 | 1 | 1 | 3.2 | 3.2.1 |
|  | **Part B Question (2 out of 3)** |  |  |  |  |  |
| 6 | What is a process model? Explain the process model using mathematical expression. | 4 | 3 | 1 | 1.3 | 1.3.1 |
| 7 | What are all the characteristics of a well-planned experiment? | 4 | 2 | 1 | 4.1 | 4.1.1 |
| 8 | Explain synergistic and antagonistic interaction with an example. | 4 | 2 | 1 | 4.1 | 4.1.4 |
|  | **Part C Question (Either one)** |  |  |  |  |  |
| 9 | Explain in detail about the seven steps in experimentation with suitable example. | 12 | 3 | 1 | 4.1 | 4.1.1 |
|  | (or) |  |  |  |  |  |
| 10 | Explain the following terms with suitable examples:  a. Degrees of freedom for interaction  b. Randomization  c. Replication  d. Blocking  e. Discrete and Continuous Data  f. Quality characteristics | 12 | 3 | 1 | 4.1 | 4.1.1 |

**Prepared by: Dr. S. Murali, Associate Professor, Dept. of Mechanical, KTR**

**Outcome Alignment Matrix:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| QUESTION  NUMBER | CO distribution | | | | |
| CO1 | CO2 | CO3 | CO4 | CO5 |
| 1 | 1 |  |  |  |  |
| 2 | 1 |  |  |  |  |
| 3 | 1 |  |  |  |  |
| 4 | 1 |  |  |  |  |
| 5 | 1 |  |  |  |  |
| 6 | 4 |  |  |  |  |
| 7 | 4 |  |  |  |  |
| 8 | 4 |  |  |  |  |
| 9 | 12 |  |  |  |  |
| 10 | 12 |  |  |  |  |
| Total | 41 |  |  |  |  |
| % | 100 |  |  |  |  |

“**Quality Matrix**”:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Question No.** | **BL Distribution** | | | |
| **L1** | **L2** | **L3** | **L4** |
| 1 | 1 |  |  |  |
| 2 |  | 1 |  |  |
| 3 | 1 |  |  |  |
| 4 | 1 |  |  |  |
| 5 | 1 |  |  |  |
| **6** |  | 4 |  |  |
| **7** |  | 4 |  |  |
| **8** |  | 4 |  |  |
| **9** |  |  | 12 |  |
| **10** |  |  | 12 |  |
| **Total** | 4 | 9 | 28 |  |
| **%** | 9.75 | 31.70 | 58.54 |  |

Prepared by: S. Murali Course Coordinator

(Kindly add name and signature) (Kindly add name and signature)

Verified and approved by: Signature of Professor In-charge

(Kindly add name and signature)

**M – Marks for each question**

**CO – Course Outcome**

**BL – Bloom’s Level**

**PO – Program Outcome**

**PI – Performance Indicator**