

5/5/26

Reg No.: _____

Name: _____



Jyothi Engineering College(Autonomous)



M.Tech Degree S2 (R) Examination, May 2026 (2025 Scheme)

25PIAT201- DESIGN OF EXPERIMENTS

Total Mark: 60

Total Time: 2hr 30min

CO MARK

PART A

Answer All Questions

1. A bag has 3 balls out of which 2 are white. Another bag has 4 balls out of which 1 is white. From each of the bags one ball is drawn at random. Find the probability that both the balls are white. CO1 (5)
 2. The average weight of a dumbbell in a gym is 90 kg. However, a physical trainer believes that the average weight might be higher. A random sample of 5 dumbbells with an average weight of 110 kg and a standard deviation of 18 kg. Using hypothesis testing check if the physical trainer's claim can be supported for a 95% confidence level. CO1 (5)
 3. Given a set of data involving 4 tropical feed stuffs A, B, C and D tried on 20 chicks given below. Analyze the data. CO1 (5)
- | | | | | | |
|---|-----|-----|-----|----|-----|
| A | 55 | 49 | 42 | 21 | 52 |
| B | 61 | 112 | 30 | 89 | 63 |
| C | 42 | 97 | 81 | 95 | 92 |
| D | 169 | 137 | 169 | 85 | 154 |
4. What are contrasts in Factorial design? CO1 (5)
 5. Explain Alias Structure. CO1 (5)

PART B

Answer Any Five Question(s)

6. Find the expectation of X and variance of X if the probability density function is $f(x) = \begin{cases} \frac{1}{10} & \text{if } 0 \leq x \leq 10 \\ 0, & \text{elsewhere} \end{cases}$ CO1 (7)
 7. To test the efficiency of sleeping pills a drug company uses a sample of medicines. The time in minutes until falling sleep is observe for each of them. Few days later the same persons are given a sleeping pill and the time until falling sleep is measured again. The measurements are given below. CO1 (7)
- | | | | | | |
|------------|----|----|----|----|----|
| Persons: | A | B | C | D | E |
| No pills: | 65 | 35 | 80 | 40 | 50 |
| With Pill: | 45 | 15 | 61 | 51 | 20 |
- Test whether the sleeping pills are effective or not.

8. Four coins are tossed 80 times. The distribution of number of heads is given below.

Number of heads: 0 1 2 3 4

Frequency: 4 20 32 18 6

Apply Chi square test as 1% level of significance if the coin is unbiased.

CO1 (7)

9. Perform the ANNOVA table for the following and obtain the conclusions.

Block / Treatment	1	2	3	4	5	6
1	24.7	20.6	27.7	16.2	16.2	24.9
2	27.3	28.8	22.9	15	17	22.5
3	38.5	39.5	36.8	19.6	15.4	26.3
4	28.5	31	34.9	14.1	17.7	22.6

CO1 (7)

10. An experiment is carried out to determine the effect of claying the ground on the field of barley grain, amount of clay used were as follows.

A: no clay

B:Clay @100 per acre↓

C: Clay@200 per acre

D:Clay @300 per acre

The yield in plots $8m \times 8m$ and layout as follows:

Row↓ Column →	1	2	3	4
1	D 29.1	B 18.9	C 29.4	A 5.7
2	C 16.4	A 10.2	D 21.2	B 19.1
3	A 5.4	D 38.8	B 24.0	C 37.0
4	B 24.9	C 41.7	A 9.5	D 28.9

CO1 (7)

Perform the ANNOVA table and state the conclusions.

11. Describe the Mathematical Model for 2^2 Factorial Design.

CO1 (7)

12. Explain Response Surface Methodology (RSM).

CO1 (7)
