

PSG COLLEGE OF ARTS & SCIENCE  
(AUTONOMOUS)

BSc DEGREE EXAMINATION MAY 2022  
(Sixth Semester)

Branch – STATISTICS

DESIGN OF EXPERIMENTS

Time: Three Hours

Maximum: 75 Marks

SECTION-A (10 Marks)

Answer ALL questions

ALL questions carry EQUAL marks

(10 x 1 = 10)

- Replication in an experiment means \_\_\_\_\_.
  - the number of blocks
  - total number of treatments
  - the number of times a treatment occurs in an experiment
  - make probability statements
- If the researcher's interest is confined in the treatment, then the statistical model in this situation will be categorized as \_\_\_\_\_.
  - analysis of variance model
  - component of variance model
  - mixed effect model
  - fixed effect model
- In a completely randomized design with  $t$  treatments and  $n$  experimental units, error degrees of freedom is equal to \_\_\_\_\_.
  - $n-t-1$
  - $n-t$
  - $n-t+1$
  - $t-n$
- Randomized block design is a \_\_\_\_\_.
  - no restriction design
  - three restriction design
  - two restriction design
  - one restriction design
- Factorial experiment deals with \_\_\_\_\_.
  - testing one factor at a time
  - cannot estimate interactions
  - all possible combination of factor levels are tested
  - restriction design
- Factorial designs allow us to study both \_\_\_\_\_ effects of the independent variables on the dependent(s).
  - main and interactive
  - rank order and correlational
  - symbiotic and dichotomous
  - dependent and independent
- In a  $3 \times 3$  factorial design, how many conditions are there in the experiment?
  - 2
  - 3
  - 6
  - 9
- In a factorial design, a main effect is the \_\_\_\_\_.
  - the combined effect of the independent variable
  - interaction effect of the independent variable
  - the effect of each independent variable on the dependent variable
  - interaction of the independent variables
- A BIBD is said to be symmetrical if number of blocks is equal to \_\_\_\_\_.
  - number of factors
  - number of treatments
  - number of levels
  - number of degrees of freedom
- In case of split plot design, statistical analysis is complicated, because different comparisons have different \_\_\_\_\_.
  - MSE
  - random error
  - standard error
  - error variance

Cont...

**SECTION - B (35 Marks)**Answer **ALL** Questions**ALL** Questions Carry **EQUAL** Marks (5 x 7 = 35)

- 11 a Describe the fundamental principles of experimentation.  
OR  
b Elucidate the layout of an ANOVA table for one-way classified data.
- 12 a Discuss merits and demerits of Completely Randomized Design(CRD).  
OR  
b What is Latin square design? Compare and contrast the Latin square design with the RBD.
- 13 a Explain the model of  $2^3$ - design.  
OR  
b Discuss briefly Yate's method of computing factorial effect totals.
- 14 a Define confounding. Explain types of confounding.  
OR  
b Discuss advantages and disadvantages of  $3^2$  factorial experiment
- 15 a Discuss briefly the concept of BIBD and split-plot design .  
OR  
b Write short notes on application of covariance techniques in RBD

**SECTION - C (30 Marks)**Answer any **THREE** Questions**ALL** Questions Carry **EQUAL** Marks (3 x 10 = 30)

- 16 Outline the various steps in carrying out the ANOVA of a two-way classified data with one observation per cell. Clearly state all assumptions.
- 17 Carry out the complete analysis of CRD.
- 18 Explain the analysis of  $2^2$  factorial experiments.
- 19 Discuss the analysis of  $3^2$  factorial design.
- 20 Explain the analysis of covariance with one concomitant variable.

Z-Z-Z

END