UNIVERSITY OF THE PUNJAB

B.S. 4 Years Program / Sixth Semester – 2019

Paper: Advanced Experimental Design (Theory)
Course Code: STAT-310 Part – I (Compulsory) Time: 15 Min. Marks: 10

Roll No. in Fig. ....

Roll No. in Words. ....

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Signature of Supdt.:

ATTEMPT THIS PAPER ON THIS QUESTION SHEET ONLY.
Division of marks is given in front of each question.
This Paper will be collected back after expiry of time limit mentioned above.

Q.1. Encircle the correct option. (10x1=10)

i) In a ...... design, a complete row or column of a Latin square design is missing.
a) Factorial b) Youden Square c) Latin Square d) None of these

ii) The following design facilitates to study the interaction effect :
a) Factorial b) Completely Randomized c) RCB d) Latin Square

iii) When the factors do not interact, ... designs are more efficient than one-at-a-time designs:
a) Factorial b) Completely Randomized c) RCB d) Latin Square

iv) A factorial model for data is called ...... if the presence of any term in the model implies the presence of all lower order terms.
a) Hierarchical b) Completely Randomized c) Split Plot d) Latin Square

v) When the factors were analyzed according to their importance in the design, the following design is useful:
a) Factorial Design b) Fractional Replication c) Split Plot d) Incomplete Block

vi) In the following design, more than one randomization can be introduced:
a) Factorial Design b) Fractional Replication c) Split Plot d) Incomplete Block

vii) The block size of a 2^5 design confounded into 4 blocks will be:
a) 5 b) 32 c) 16 d) 8

viii) The BIBD is called "balanced" because the .... of the estimated difference of treatment effects $\hat{\alpha}_i - \hat{\alpha}_j$ is the same for all pairs of treatments i, j.
a) Mean b) Variance c) Ratio d) None of these

ix) Partially Balanced Incomplete Block Designs (PBIBD) allow us to run incomplete block designs with .... blocks than may be required for a BIBD.
a) fewer b) larger c) same d) None of these

x) A design with a = 12, k = 7, r = 7, and b = 12 will be called:
a) BIBD b) PBIBD c) Latin Sqaure d) None of these

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B.S. 4 Years Program / Sixth Semester – 2019

Roll No. ....

Paper: Advanced Experimental Design (Theory)
Course Code: STAT-310 Part – II

Time: 2 Hrs. 45 Min. Marks: 50

ATTEMPT THIS (SUBJECTIVE) ON THE SEPARATE ANSWER SHEET PROVIDED

SHORT QUESTIONS

*(5*4)*

Q2. Define the following:

i. Advantages and Disadvantages of Factorial Design
ii. iii. Fractional Replication
iii. Quasi Latin Squares
iv. iv. Split-Split Plot Designs

LONG QUESTIONS

Q3. Complete ANOVA table for the following factorial experiment. ABC is completely confounded. *(08)*

Replicate I		Replicate II	
Block1	Block 2	Block1	Block 2
b=4	(1)=10	a=6	bc=6
a=6	ab=7	abc=9	ac=8
c=9	bc=8	c=8	(1)=11
abc=5	ac=6	b=7	ab=8

Q4. In a split plot design the whole plot treatment (A) were applied to 3 blocks and sub-plot treatment (B) were then applied to split plot. The total SS, Block SS, whole Plot Error SS are 822.97, 77.55 and 36.28 respectively. The sum for 3 blocks are given in the following table:

	B_1	B_2	B_3	B_4
A_1	89	104	118	117
A_2	100	117	119	126
A_3	92	92	104	121

Complete the ANOVA and draw your conclusions. Also Compute the standard error for the

i) difference between two 'A' treatment means
ii) difference between two 'B' treatment means *(08)*

Q5. Consider the 2^{8-4} fractional factorial with generator I = BCDE = ACDF = ABCG = ABDH. Find the aliases of C. *(06)*

Q6. Data on screen colour difference on a television tube measured in degrees Kelvin are to be compared for Four operators. On a given day only three operators can be used in the experiment. A balanced incomplete block design gave results as follows: *(08)*

	Days			
Operators	Monday	Tuesday	Wednesday	Thrusday
A	173	174	--	171
B	-	175	167	172
C	183	175	168	-
D	175	-	172	175

Do a complete analysis of these data and discuss your findings with regard to difference between operators.