# DGG-003-017401 Seat No. _____

# M. Sc. (Sem. IV) (CBCS) (Statistics) Examination

## May / June – 2015

## STAT. CST - 4001 : Advance Design of Experiments

**Faculty Code : 003**
**Subject Code : 017401**

Time : $2\frac{1}{2}$ Hours] [Total Marks : **70**

**Q-1 Answer any seven of the following.** **(14)**

(i) For BIB Design :
(a) E = 0 (c) 0 > E
(b) 0 < E<1 (d) 0 >E >-1

(ii) Projective Geometry (PG) Method gives.....
(a) Orthogonal BIBD (c) Non-Symmetrical BIBD
(b) Non-Orthogonal BIBD (d) Symmetrical BIBD

(iii) General combined ability of CDC plan is given as:____
(a) $\left[\frac{k}{k(v-2)-1}\right]$ (c) $\left[\frac{-k}{k(v-2)-1}\right]\frac{2}{\sigma^2}$
(b) $\left[\frac{-k}{k(v-2)-1}\right]$ (d) $\left[\frac{k}{-k(v-2)-1}\right]\sigma^2$

(iv) For D-Optimality Minimum Generated Variance is :
(a) $|Trace\ (cd)|^{-1}$ (c) $\frac{1}{|Trace\ (cd)^*|^{-1}}$
(b) $|Trace\ (cd)^*|^{-1}$ (d) $\left[\frac{1}{|Trace\ (cd)^*|^{-1}}\right]^{2/\theta}$

(v) Relation between $v(\hat{\tau}_i - \hat{\tau}_j)\ RBD$ .... $v(\hat{\tau}_i - \hat{\tau}_j)\ BIBD$ is
(a) > (c) <
(b)= (d) ≠

(vi) Who gave a concept of weighing design?
(a) Curnow (c) Yates
(b) Grundy (d) Ghosh

(vii) A PBIB design with two associate classes is said to be simple PBIB design if either
(a) $\lambda_1 \neq 0, \lambda_2 = 0$ or $\lambda_1 = 0, \lambda_2 \neq 0$ (c) $\lambda_1 \neq 0, \lambda_2 = 0$ and $\lambda_1 = 0, \lambda_2 \neq 0$
(b ) $\lambda_1 \neq 0, \lambda_2 = 0$ (d) None of above

(viii) In CDC plan all the crosses occurs_____ no.of times.
(a) Equal (c) Unequal
( b) Twice (d) all of above

(ix) A field is said to G.F. if it is closed under the operation of _____
(a) +,-,*,/ (c) +,-
(b ) *,/, - (d) None

(x) In triangular type PBIB design the position in the principle diagonal of the array are ____blank.

(a) Left (c) right

(b ) middle (d) none

**Q – 2 Answer the following questions (Any Two)** **(14 )**

1. Construct BIBD with v= 9, B=12, r =4, k =3, λ =1 using EG(N,S) method.
2. Define PBIBD explaining its association schemes.
3. Obtain A – efficiency of a BIBD against the loss of one observation.
4. Prove that $\sum_{i=1}^{n} n_i\lambda_i = r(k-1)$

**Q – 3 Answer the following questions** **(14 )**

1. Define following terms
   a. Orthogonal array
   b. Orthogonal main effect
2. Derive the analysis of CDC Plan

**Q – 3 Answer the following questions** **(14 )**

1. Discuss the analysis of general row column designs and write its ANOVA table.
2. Discuss Latin square type of BIBD with its example.

**Q – 4 Answer the following questions (Any Two)** **(14 )**

1. Discuss general combining ability effect and specific combining ability effect.
2. Construct BIBD using PG(N,S) where N = 2, S = 2, m=1.
3. Discuss E – Optimality of BIBD
4. ½ ($2^7$) reduced into block of size $2^3$.

**Q – 5 Answer the following questions (Any Two)** **(14 )**

1. Define following terms:-
   a. Resolvable BIBD
   b. affine resolvable BIBD
   c. α – affine resolvable BIBD
   d. PBIBD
2. Define following terms:-
   a. Triangular PBIBD
   b. Cyclic PBIBD
   c. Group divisible PBIBD
   d. Latin square PBIBD
3. Construct MOLS design of size 9.
4. Explain Robustness of CDC plan against the loss of observations.