



**MASENO UNIVERSITY**  
**UNIVERSITY EXAMINATIONS 2015/2016**

**FIRST YEAR SECOND SEMESTER EXAMINATIONS FOR  
THE DEGREE OF MASTER OF SCIENCE IN APPLIED  
STATISTICS**

**CITY CAMPUS**

**SAS 810: DESIGN AND ANALYSIS OF EXPERIMENT**

Date: 21<sup>st</sup> May, 2016

Time: 9.00 - 12.00 noon

---

**INSTRUCTIONS:**

- Answer question ONE and any other TWO questions.



**Question One (24 mark)**

- (a) Define Plane PG and EG (4 marks)
- (b) What are the advantages and disadvantages BIB design (6 marks)
- (c) Prove the necessary conditions for existence of BIB design. (6 marks)
- (d) Give a fractional of  $2^4$ - experiment in which treatment AB is not estimable. (8 marks)

**Question Two (18 marks)**

- (a) Prove that  $b \geq v$  (10marks)
- (b) Construct BIB(13,4,1). (10 marks)

**Question Three (18 marks)**

- (a) Obtain a BIB design with parameters  $b=14$ ,  $v=8$ ,  $r=7$ ,  $k=4$  and  $\lambda=3$  (10 marks)
- (b) Prove that there is no BIB design with parameters  $v=15$ ,  $k=5$ ,  $\lambda=2$  (10 marks)

**Question Four (18 marks)**

- (a) In  $2^5$ -factorial obtain the estimates of main effect, two and three factor interactions. (10 marks)
- (b) In  $2^5$ -factorial arrange the treatments to blocks

$$x_1 + x_3 + x_5 = 0,1$$

$$x_2 + x_4 + x_5 = 0,1$$

$$x_2 + x_4 = 0,1$$

Which treatments are confounded

(10 marks)

**Question Five (18 marks)**

(a) In  $\frac{1}{2}$   $2^5$  – factorial experiment give contrasts in which all main effects will be aliases to two factor interactions. Give other treatments main effects are aliased to.

(10 marks)

(b)  $\frac{1}{2}$   $2^6$ -factorial in eight blocks given by

$$x_1 + x_3 + x_4 = 0,1$$

$$x_2 + x_3 + x_5 = 0,1$$

$$x_3 = 0,1$$

Give the aliases if the treatment contrast is ADE

Which treatments are confounded.

(10 marks)