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## SARDAR PATEL UNIVERSITY M.Sc. (III Semester) Examination

Tuesday, 19<sup>th</sup> March
2:00 p.m. to 5.00 p.m.
STATISTICS COURSE No. PS03CSTA01 (Design of Experiments)

Note:	Figures to the right indicate full	marks of the questions. (Total Marks: 70)	
1	Attempt all, write correct answers In usual notations for general block designs, 1'R equals  a) k  b) r		08
(i)	c) r'	d) none of these	
(ii)	The number of zeros in an i	incidence matrix of a GBD is b) less than vb	
	c) more than vb	d) vb-vr	
(iii)	A Youden square design is a of block designs a) CRD, BIBD	row column design consisting of the following pair b) RBD, BD	
	c) BD, BIBD	d) RBD, BIBD	
(iv)	In context of a two associate a) $n_1$	class PBIBD the sum of P- matrix elements is $\dots$ b) $n_1$ -1	
	c) $n_{1+}n_2-1$	d) n <sub>2</sub> -1	
(v)	To accommodate 2 <sup>3</sup> design as Block size and replica a) 8,7, 4	nd analysis in BIBD we need it with treatments, tions. b) 8, 4, 7	
	c) 7, 8, 4	d) 8, 4, 8	
(vi)	To confound AB interaction filled with,	in 2 <sup>2</sup> factorial the blanks should respectively be	
	is a) b, a c) 1, b	b) b, 1 d) None of these	
(vii)	The number of degrees of free case of factorial experiments  a) 5 c) 25	eedom for three factor interactions sum of squares in a in A, B, C, D, E factors are b) 2 <sup>5</sup> d) 10	

(viii)	The alias for A in ½ (2³) is when the defining contrast is a) ABC, AC b) BC, ABC c) BC, AB d) None of these		
2	Attempt ANY 7, each carries 2 marks		
(a)	Give plan of smallest BIBD and two associate PBIBD.		
(b)	State and prove Fisher's inequality.		
(c)	What is SBIBD? State and prove a result associated with an SBIBD.		
(d)	Construct the smallest ARBIBD.		
(e)	Define the three important properties of block designs.		
<b>(f)</b>	In usual notation of two associate PBIBD, show that $r(k-1) = n_1 \lambda_1 + n_2 \lambda_2$ .		
(g)	Check whether design is connected or not, its blocks are (A B D) (B E G) (C A G) (B A C).		
(h)	What is block section of SBIBD?		
(i)	Explain balanced confounding.		
3(a)	State and prove a necessary and sufficient condition for a block design to be balanced.		
3(b)	Find the matrix through which we can verify the properties of the following design. What if block 1 treatment A is missing? { (A B D), (A C D), (B D C), (A B C) }		
	OR		
	Define linear model of general block design and derive normal equations for estimation of its parameters.		
4(a)	Define BIBD. Derive the intra block and inter-block estimates of treatment effects of a BIB design.		
4(b)	Construct BIBD in 11 treatments. And derive at least one more BIBD from it.	06	
	OR		
	Construct BIB designs having parameters v=9, b=12, r=4, k=3, $\lambda$ =1.		
5(a)	Discuss intra block analysis of Youden square design.	06	
5(b)	Discuss two properties of two associate class PBIBD.  OR		
	Derive formula for estimating one missing observation in BIBD. What are the alternative ways to analyse such BIBD data?		
6(a)	Explain terms: factorial design, main effect plans, resolution IV design, first order response surface design.	06	
6(b)	Explain partial confounding giving an example.	06	
	OR		
6(b)	Construct a fractional factorial having 7 factors in 8 runs.		