Reg. No. : | | | | | | | | | | |

Question Paper Code: 52109

M.E. DEGREE EXAMINATION, NOV 2016

Elective

CAD / CAM

15PCD522 - DESIGN AND ANALYSIS OF EXPERIMENTS

(Regulation 2015)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

(5 x 20 = 100 Marks)

1. (a) In a small town, a hospital is planning for future needs in its maternity ward. The data in given table, show the number of births in the last eight years.

Year:	1	2	3	4	5	6	7	8
Births:	565	590	583	597	615	611	610	623

(i) Develop a simple linear regression model to the data for estimating the number of births

(ii) Test the significance of regression using *F*-test. (20)

Or

(b) (i) Explain the various steps involved in experiment design process. (10)

(ii) Discuss the linear regression model in detail. (10)

2. (a) Four different printing processes are being compared to study the density that can be reproduced. Density readings are taken at different dot percentages. As the dot percentage is a source of variability, a completely randomized block design has been used and the data obtained are given in the table . Analyze the data and draw the conclusions. Use $\alpha = 0.05$.

Type of process	Dot percentages (Block)			
	1	2	3	4
Offset	0.90	0.91	0.91	0.92
Inkjet	1.31	1.32	1.33	1.34

Dye sub	1.49	1.54	1.67	1.69
Thermal wax	1.07	1.19	1.38	1.39

(20)

Or

(b) Develop the analysis of covariance for randomized block design with one Co-commitant variable, stating clearly the assumptions. (20)

3. (a) Explain in detail about three factor full factorial experiments with suitable example. (20)

Or

(b) A study was conducted using a 2^3 factorial design with factors *A*, *B* and *C*. The data obtained are given in below table.

Treatment combination	Response	
	R_1	R_2
(1)	15	12
a	17	23
b	34	29
ab	22	32
c	18	25
ac	5	6
bc	3	2
abc	12	18

Analyze the data assuming that each replicate (*R*1 and *R*2) as a block of one day. (20)

4. (a) Construct a 2^{5-2} design with *ACE* and *BDE* as generators. Determine the alias structure. (20)

Or

(b) Explain in detail about approximate F-tests. (20)

5. (a) (i) Illustrate the applications of orthogonal arrays. (10)

(ii) Discuss about various controllable and noise factors. (10)

Or

(b) Construct a case study for the three types of signal-to-noise ratio (S/N Ratio) used in taguchi's robust design. (20)