

Roll No.

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

B.E/B.Tech (FULL-TIME) DEGREE END SEMESTER EXAMINATIONS – APRIL / MAY 2019

Industrial Engineering

VII SEMESTER

(R2012)

IE8755 DESIGN OF EXPERIMENTS

Time: Three hours

Max. Marks: 100

Answer ALL questions

(Use of Statistical Table is permitted)

PART – A (10 X 2 = 20 Marks)

1. List the steps in Hypothesis testing
2. State the need for Experimentation
3. Write short note on Randomized Block Design
4. What is Contrast?
5. What do you mean by random effects model ?
6. When Randomized Block Factorial Design is used for experimentation?
7. Define Confounding
8. Write short note on Response Surface Method
9. State the advantages of Taguchi Methods
10. What do you mean by Robust design?



Part-B (5 X 16 = 80 Mark)

11. A plant manager wants to evaluate the effect of Temperature with three levels on the Yield of a process and selected Completely Randomized Design for experimentation. The collected data is given below. Analyze the data and draw conclusions. Use $\alpha = 5\%$.

Temperature (°C)	Observations				
	1	2	3	4	5
50	253	258	249	252	260
60	255	257	253	257	264
70	260	262	255	264	269

12a. The following data were collected to study the relationship between the Yield (Y) and the Temperature(X). Fit a Simple Linear Regression equation.

Temperature in °C (X)	20	30	40	50	60
Yield in Kgs (Y)	20	50	70	100	110

(OR)

12b. An Engineer tested two different types of concrete (A and B). The coded strength values are given below. Engineer wanted to determine whether there is a difference between the two types or not. Analyse the data and draw conclusions. Use $\alpha = 5\%$.

Concrete A	2	4	2	1	9	9	2	2
Concrete B	8	3	5	3	7	7	4	4

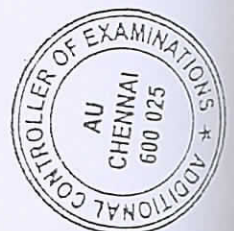
13a. A two factor Factorial experiment was used to study the effect of two factors A (3 levels) and B(2 levels) on the output of a process. The data collected from the experiment is given below. Analyse the data and draw conclusions .Use $\alpha = 5\%$.

B	A		
	1	2	3
1	65	128	101
	75	154	123
2	56	101	103
	35	112	115

(OR)

13b. Data for a 2^3 factorial design with two replications is given below. Using Yate's algorithm and carry out the analysis. Use $\alpha = 5\%$.

Rep 1		Rep 1	
(1)	45	(1)	43
a	71	a	100
b	48	b	45
ab	65	ab	104
c	68	c	75
ac	60	ac	86
bc	80	bc	70
abc	65	abc	96



14a. Construct a 2^4 confounded design with ABCD effects confounded within two blocks.

(OR)

14b. Briefly explain about the steps involved in the Construction of one-half fraction of 2^k Design.

15a. State and explain in detail about steps involved in Taguchi's design and analysis of experiments.

(OR)

15b. Analyse the following data using response graph method and draw conclusions

Expt	A	B	C	D	E	F	G	Response	
								R ₁	R ₂
1	1	1	1	1	1	1	1	29	84
2	1	1	1	2	2	2	2	76	76
3	1	2	2	1	1	2	2	36	22
4	1	2	2	2	2	1	1	41	50
5	2	1	2	1	2	1	2	61	24
6	2	1	2	2	1	2	1	45	56
7	2	2	1	1	2	2	1	67	51
8	2	2	1	2	1	1	2	41	34