SIX SIGMA – TEST II

Answer any 5 questions, Time 60min, Max Marks

1) Explain the disadvantages of one at a time experimentation.

OR

2) Explain the tests to confirm adequacy of the model.

3) A dice was thrown 50 times and the frequencies 3, 9, 8 13, 7, 10 obtained for the numbers on the faces from 1 to 6 respectively. Test whether the dice is fair at 90% level.

OR

4) A patent was claimed for a new cake mix. Five recipes were used for making a number of cakes, starting from two different types of premix A and B. The volumes of the cakes were measured with the following results:

Recipe	1	2	3	4	5
Mix A	83	90	96	83	90
Mix B	65	82	90	65	82

The five recipes differed somewhat in amount of water added, beating time, and baking temperature. The patent claimed that significantly greater volume was obtained with A. Did the data support the claim? Choose 90% confidence level.

5) A process has a mean of 210 and standard deviation of 2. The specifications are set at 200 +/-20. Determine the Cpmk and DPMO for the process.

OR

6) Determine the DPO and DPMO for the data given below:

Characteristic	Defects	Units	Opportunities/unit
A	32	427	12
B	45	325	18
C	16	286	9

7) Five different treatments were administered to 17 human subjects. The allocation of treatments to subjects was random. Their performance on a specific task was measured. Scores in coded units are given below. Calculate the *within treatment* mean square.

A	B	C	D	E
1	9	6	3	14
3	5	6	3	10
5	5	3	0	18
	5		6	

OR

8) An experiment was done to compare the tensile strengths of cotton yarn produced by 5 machines. Complete the analysis of variance table and test for significance at 95% level.

Source of variation	Sum of squares	Degrees of freedom	Mean square
Machines	461		
Error			
Total	1038	19	

9) It is proposed to conduct an experiment to study the variables affecting surface finish in machining. Write down a two level full factorial experiment in uncoded variables for the factors as given below. Also allocate the run order.

Variable	Unit	Low level	High level
Feed rate	mm/rev	0.02	0.2
Depth of cut	mm	0.5	3.0
Nose radius	mm	0.3	0.8
Rake angle	°	5	10

OR

10) Find the main effects and interaction from the following data:

Nickel %	Manganese %	Breaking strength ft-lb
0	1	35
3	1	46
0	2	42
3	2	40

11) The following results were obtained from a 2^2 factorial experiment with three replications. Test for the significance of effects.

A	B	Average of 3 responses	Variance of 3 responses	Effect	Identification
-1	-1	60	21	58.25	Const
1	-1	54	9	6.5	A
-1	1	50	9	2.5	B
1	1	69	9	12.5	AB

OR

12) The results of a 2^2 factorial experiment with two replications are given below:

Run order	X1	X2	Y
4	-1	-1	70
8	1	-1	64
1	-1	1	69
7	1	1	74
5	-1	-1	62
3	1	-1	60
2	-1	1	73
6	1	1	80

If the constant term is 69.0, main effect of A 1.0, main effect of B 10.0 and interaction effect of AB 5.0, determine the model equation to predict the response. The main effect of A is not significant. Calculate the residuals at each run.