

CODE: 17CF54101

MCA I Year I Semester Regular Examinations, December 2017
PROBABILITY AND STATISTICS

Time: 3 hours

Max Marks: 60

Answer all **five** units. (5 x 12 = 60 Marks)

UNIT-I

1. a) State and prove Baye's theorem on probability
- b) Two unbiased dice are thrown. Write down the sample space of this experiment. Find the probability of getting: (i) both the dice show the same number, (ii) the first die shows odd number and (iii) sum of the digits on the upper faces multiple of 4.

OR

2. a) If 10% of the bolts produced by machinery are defective, find the probability that out of 10 bolts chosen at random. Find i) none will be defective ii) one will be defective and iii) at most seven bolts will be defective.
- b) In a normal distribution, 7% of the items are under 35 and 89% of the items under 63. Find the mean and standard deviation of the distribution.

UNIT-II

3. a) Explain two sample mean procedure stepwise, if both are taken from the same population.
- b) The time taken by workers in performing a job by method one and method two is given below.

Method-I	20	16	26	27	23	22	
Method-II	27	33	42	35	32	34	38

Do the data show that the variances of time distribution from population from which these samples are drawn any significant difference?

OR

4. a) 1000 students at college level were graded according to their IQ and the economic conditions of their homes. Use chi square test to find out whether there is any association between economic condition at home and IQ.

		economic condition		
		High	Medium	Low
Rich	320	200	110	
Poor	170	110	90	

- b) A machine produced 20 defective articles in a batch of 400. After overhauling it produced 10 defectives in a batch of 300. Has the machine improved?

UNIT-III

5. a) Define ANOVA and state its assumptions.

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b) The following are the number of mistakes made in 5 successive days for 4 technicians working for a photographic laboratory:

Technician - I	Technician - II	Technician - III	Technician - IV
6	14	10	9
14	9	12	12
10	12	7	8
8	10	15	10
11	14	11	11

Test at the level of significance of 0.01 whether the differences among the 4 sample means can be attributed to chance

OR

6. A varietal trial was conducted at a research stations. The design adopted for the same was four randomized blocks of four plots each. The yields in lbs per plot obtained from experiment are as under. Analyse the design and comment on your findings.

	Variety-1	Variety-2	Variety-3	Variety-4
Block-1	30	23	20	29
Block-2	39	22	28	33
Block-3	38	28	32	37
Block-4	39	31	34	31

UNIT-IV

7. a) What is control chart? Explain the basic principles underlying the control charts. Discuss the role of control charts in manufacturing process.
- b) The following are the mean and range of 20 samples of size 5 each. The data pertaining to the overall length of a fragmentation bomb base manufactured during the war by the Americans store camp.

Group No	Mean	Range	Group No	Mean	Range
1	0.8372	0.010	11	0.8380	0.006
2	0.8324	0.009	12	0.8322	0.002
3	0.8318	0.008	13	0.8356	0.013
4	0.8344	0.004	14	0.8322	0.005
5	0.8346	0.005	15	0.8404	0.008
6	0.8332	0.011	16	0.8372	0.011
7	0.8340	0.009	17	0.8282	0.006
8	0.8344	0.003	18	0.8346	0.006
9	0.8308	0.002	19	0.8360	0.004
10	0.8350	0.006	20	0.8374	0.006

From, these data, obtain the control limits for \bar{x} and R charts to control the length of bomb bases produced in the future.

OR

8. a) Explain what are the chance and assignable causes of variation in the quality of manufactured product.

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b) The following data gives the number of defectives in 10 independent samples of varying sizes from a production process.

Sample No	Sample Size	Number of defectives
1	2000	425
2	1500	430
3	1400	216
4	1325	341
5	1250	225
6	1760	322
7	1875	280
8	1955	306
9	3125	337
10	1575	305

Draw the control chart for fraction defective.

UNIT-V

9. a) The following are the heights in inches of Fathers (X) and their Sons (Y). Calculate the correlation coefficient between the heights of fathers and their sons

X	65	66	67	67	68	69	70	72
y	67	68	65	68	72	72	69	71

b) Determine the constants a and b by method of least squares such that $y = ae^{bx}$.

X	2	4	6	8	10
y	4.077	11.084	30.128	81.897	222.62

OR

10. a) The study was conducted on the amount of converted sugar in a certain process and different levels of temperature. Estimate the mean amount of converted sugar when temperature is 1.64.

Temp	1.0	1.2	1.4	1.6	1.8	2.0	2.2	2.4
Converted sugar	8.1	8.5	9.5	8.6	9.2	9.7	8.1	9.0

b) Define correlation. State its properties.
