

MCA I Semester Supplementary Examinations June/July 2018

PROBABILITY & STATISTICS

(For students admitted in 2017 only)

Time: 3 hours

Max. Marks: 60

Answer all the questions

- 1 (a) In a factory machine A produce 40% of the output and machine B produces 60% on the average, 9 items in 1000 produced by A are defective and 1 item in 250 produced by B is defective. An item drawn at random from a day's output is defective. What is the probability that it was produced by A or B?
- (b) Two dice are thrown. Let X assign to each point (a, b) in S the maximum of its numbers be $X(a, b) = \max(a, b)$. Find the probability distribution. X is a random variable with $X(s) = \{1, 2, 3, 4, 5, 6\}$. Also find the mean and variance of the distribution.

OR

- 2 (a) Derive mean of binomial distribution.
- (b) The marks obtained in statistics in a certain examination found to be normally distributed. If 15% of the students ≥ 60 marks. 40% < 30 marks. Find the mean and standard deviation.
- 3 (a) In a sample of 1000 people in Karnataka 540 are rice eaters and the rest are wheat eaters. Can we assume that both rice and wheat are equally popular in this state at 1% level of significance?
- (b) A sample of 400 items is taken from a population whose standard deviation is 10. The mean of the sample is 40. Test whether the sample has come from a population with mean 38. Also calculate 95% confidence interval for the population.

OR

- 4 (a) The measurements of the output of two units have given the following results. Assuming that both samples have been obtained from the normal population at 10% significant level test whether the two populations have the same variance.

Unit – A	14.1	10.1	14.7	13.7	14.0
Unit – B	14.0	14.5	13.7	12.7	14.1

- (b) Two random samples gave the following results.

Sample	Size	Sample mean	Sum of squares of deviation from the mean
1	10	15	90
2	12	14	108

Test whether the samples came from the same normal population.

- 5 Three different machines are used for a production on the basis of the outputs, test whether the machines are equally effective.

Outputs		
Machine 1	Machine 2	Machine 3
10	9	20
5	7	16
11	5	10
10	6	4

OR

- 6 (a) Explain Latin Square Design.
- (b) Write down the Anova table for two-way classification.

Contd. in page 2

Code: 17FBS101

- 7 (a) Explain the terms chance cause and assignable cause.
 (b) The following data gives reading 10 samples of size 6 each certain component.

Sample	1	2	3	4	5	6	7	8	9	10
Mean $\bar{X}$	383	508	505	582	557	337	514	614	707	753
Range R	95	128	100	91	68	65	148	28	37	80

Draw control charts for $\bar{X}$ (for $n = 6$, $A_2 = 0.483$) and your conclusion.

OR

- 8 The following are the figures of detectives in 22 lots each containing 2,000 rubber belts: 425, 430, 216, 341, 225, 322, 280, 306, 337, 305, 356, 402, 216, 264, 126, 409, 193, 326, 280, 389, 451, 420.
 Draw control charts for fraction defective and comment on the state of control of the process.

- 9 (a) Write Normal equation to fit the curve $y = ae^x$.
 (b) Fit a second degree polynomial for the following data:

x	10	12	15	23	20
y	14	17	23	25	21

OR

- 10 Calculate the correlation coefficient for the data:

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

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