Code: 9ABS304

R09

B.Tech II Year I Semester (R09) Supplementary Examinations June 2017

PROBABILITY & STATISTICS

(Common to MCT & CSE)

Time: 3 hours Max. Marks: 70

Answer any FIVE questions

All questions carry equal marks

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1 (a) If a test consists of 12 true false questions in how many different ways can a student make the test paper with one answer to each question?

(b) The bolts are drawn from a box containing 4 good and 6 bad bolts. Find the probability that the second bolt is good if the first one is found to be bad.

2 (a) Find the mean and variance of the uniform probability distribution given by f(x) = 1/n for x = 1, 2, 3, …..n.

(b) For the continuous probability distribution $f(x) = kx^2e^{-x}$ where $x \geq 0$, find mean.

3 (a) The mean and variance of a binomial distribution are 4 and 4/3 respectively. Find $\rho(x \geq 1)$.

(b) A manufacturer knows that the condensers he makes contain average 1% defectives. He packs them in boxes of 100. What is the probability that a box picked at random will contain 3 or more faulty condensers?

4 A random sample of size 64 is taken from a normal population with μ = 51.4 and σ = 68. What is the probability that the mean of the sample will: (i) Exceed 52.9? (ii) Fall between 50.5 and 52.3. (iii) Be less than 50.6.

5 (a) Find 95% confidence limits for the mean of a normality distributed population from which of the following sample was taken 15,17,10,18,16,9,7,11,13,14.

(b) A sample of size 10 was taken from a population S.D of sample is 0.3. Find the maximum error with 99% confidence.

6 (a) An ambulance service claims that it takes on the average less than 10 minutes to reach its destination in emergency calls. A sample of 36 calls has a mean of 11 minutes and the clearance of 16 minutes. Test the significance at 0.05 level.

(b) If 80 patients are treated with an antibiotic 59 got cared. Find a 99% confidence limits to the true population of care.

7 (a) The height of 10 males of a given locality are found to be 70, 67, 62, 68, 61, 68, 70, 64, 64 & 65 inches. Is it reasonable to believe that the average height is greater than 64 inches? Test at 5% significance level assuming that for 9 degrees of freedom.

(b) Define the statistics “F” and “t”.

8 Assume that both arrival rate and service rate following Poisson distribution. The arrival and service rate are 25 and 35 customers per hour respectively at a single window in R.T.C reservation counter. Find: (i) ρ . (ii) L_s . (iii) L_q . (iv) W_s . (v) W_q .

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Code: 13A54303 **R13**

B.Tech II Year I Semester (R13) Supplementary Examinations June 2017

PROBABILITY & STATISTICS

(Common to IT & CSE)

Time: 3 hours Max. Marks: 70

PART - A

(Compulsory Question)

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1 Answer the following: (10 X 02 = 20 Marks)

(a) A fair die is tossed twice. Find the probability of getting a 4, 5 or 6 on the first toss and 1, 2, 3 or 4 on the second toss.

(b) State addition theorem of probability for any two events.

(c) If $f(x) = K(1-x^2), \quad for\ 0 < x < 1$
$= 0, \quad otherwise,$ Find K.

(d) The probability of a man hitting a target is $^1/_4$. If he hits 7 times, find the probability of hitting the target at least twice.

(e) If $n = 144$, S.D, $\sigma = 4$ and the mean = 150, then find 95% confidence interval for μ.

(f) What is the significance of ANOVA?

(g) Define Type I and Type II errors.

(h) Find the finite population correction factor for n = 10 and N = 100.

(i) Define SQC.

(j) Define $(M/M/1):(\infty/FIFO)$ queueing system.

PART - B

(Answer all five units, 5 X 10 = 50 Marks)

UNIT - I

2 (a) Two aeroplanes bomb a target in succession. The probability of each correctly scoring a hit is 0.3 and 0.2 respectively. The second will bomb only if the first misses the target. Find the probability that (i) Target is hit. (ii) Both fails to score hits.

(b) Suppose 5 men out of 100 and 25 women out of 10,000 are colour blind. A colour blind person is chosen at random. What is the probability of the person being a male (Assume male and female to be in equal numbers)?

OR

3 (a) A sample of 4 items is selected at random from a box containing 12 items of which 5 are defective. Find the expected number E of defective items.

(b) The probability density $f(x)$ of a continuous random variable is given by $f(x) = Ce^{-|x|}, -\infty < x < \infty$. Find C, mean and variance of the distribution. Also find $P(0 < x < 4)$.

UNIT - II

4 (a) An oceanographer wants to check whether the depth of the ocean in a certain region is 57.4 fathoms, as had previously been recorded. What can he conclude at the 0.05 level of significance, if readings taken at 40 random locations in the given region yielded a mean of 59.1 fathoms with a standard deviation of 5.2 fathoms?

(b) A random sample of size 16 values from a normal population showed a mean of 53 and a sum of squares of deviations from the mean equals to 150. Can this sample be regarded as taken from the population having 56 as mean. Obtain 95% confidence limits of the mean of the population.

OR

5 The nicotine contents in milligrams in two samples of tobacco were found to be as follows:

Sample A	24	27	26	21	25	-
Sample B	27	30	28	31	22	36

Can it be said that the two samples have come from the same normal population?

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UNIT - III

6 Three samples, each of size 5, were drawn from three uncorrelated normal populations with equal variances. Test the hypothesis that the population means are equal at 5% level.

Sample I	10	12	19	16	13
Sample II	9	7	12	11	11
Sample III	14	11	15	14	16

OR

7 To study the performance of three detergents and three different water temperatures, the following whiteness readings were obtained with specially designed equipment.

Water temperature	Detergent A	Detergent B	Detergent C
Cold water	57	55	67
Warm water	49	52	68
Hot water	54	46	58

Perform a two way analysis of variance using 5% level of significance. (Given F = 6.94)

UNIT - IV

8 (a) What are 3σ control limits? Explain the difference between confidence limits and control limits.

(b) The following data gives readings 10 samples of size 6 each in production of a 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). What is your conclusion?

OR

9 The following data show the values of sample mean, $(\bar{x})$ and range (R) for 10 samples of size 6 each. Calculate the values for central line and control limits for mean – chart and range – chart. Draw the control charts and comment on the state of control.

Sample No	1	2	3	4	5	6	7	8	9	10
Mean $\bar{X}$	43	49	37	44	45	37	51	46	43	47
Range R	5	6	5	7	7	4	8	6	4	6

UNIT - V

10 A fast food restaurant has one drive-in window. It is estimated that cars arrive according to a Poisson distribution at the rate of 2 every 5 minutes and that there is enough space to accommodate a line of 10 cars. Other arriving cars can wait outside this space, if necessary. It takes 15 minutes on the average to fill on order, but the service time actually varies according to an exponential distribution. Determine the following:

(a) The probability that the facility is idle.

(b) The expected number of customers waiting to be served.

(c) Effective arrival rate.

(d) The time a customer expects to spend in the system.

OR

11 Discuss $(M/M/1):(\infty/FCFS)$ queueing model and find the expected queue length in the system.

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