Code: 15A54401

R15

B.Tech II Year II Semester (R15) Supplementary Examinations December 2017
PROBABILITY & STATISTICS
(Common to CE, CSE, IT and ME)

Time: 3 hours

Max. Marks: 70

PART – A
(Compulsory Question)
(Use of statistical tables is permitted in the examination hall)
*****

1   Answer the following: (10 X 02 = 20 Marks)
  (a) Define: (i) Sample space. (ii) Mutually exclusive events.
  (b) Assume that 50% of all engineering students are good in mathematics. Determine the probability that among 18 exactly 10 are good at mathematics.
  (c) If 80% patients are treated with an antibiotic 59 got cared. Find a 99% confidence limits to the true population.
  (d) The test statistic in case of single mean for large samples is -------
  (e) When we apply F-test of significance?
  (f) Find $p(t > -2.567)$ when $v = 17$.
  (g) What are control limits for P-charts?
  (h) Explain control charts for attributes.
  (i) The probability density function of the waiting time distribution excluding the service time is --------
  (j) Define transient and steady state of a queuing system.

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

UNIT – I

2   The cumulative distribution function for a continuous random variable X is $f(x) = \begin{cases} 1 - e^{-2x}, & x \geq 0 \\ 0, & x < 0 \end{cases}$ then find: (i) Density function $f(x)$. (ii) Mean. (iii) Variance.

OR

3   Derive Mode and Median of normal distribution.

UNIT – II

4   A random sample of 500 apples was taken from a large consignment of 60 were found to be bad, obtain the 98% confidence limits for the percentage number of bad apples in the consignment.

OR

5   Among the items produced by a factory out of 800, 65 were defective in another sample out of 300, 40 were defective. Test the significance between the differences of two proportions at 1% level.

UNIT – III

6   Two independent samples of 8 and 7 items respectively had the following values.

Sample I	11	11	13	11	15	9	12	14
Sample II	9	11	10	13	9	8	10	-

Is the difference between the means of samples significant?

OR

7   From the following data, find whether there is any significant linking in the habit of taking soft drinks among the categories of employees.

Soft drinks	Employees		
	Clacks	Teaches	Officers
Pepsi	10	25	65
Thumsup	15	30	65
Fanta	50	60	30

Code: 15A54401

UNIT – IV

8   The following data show the values of sample mean $\bar{x}$ and range (R) for 10 samples for size 6 each. Calculate the values for central line and the control limits for mean-chart and range-chart. Draw both 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

OR

9   The following are the figures of defectives in 22 lots each containing 2,000 rubber bets.

425, 430, 216, 341, 225, 322, 280, 306, 337, 305, 356,
402, 216, 264, 126, 409, 193, 326, 280, 389, 451, 420

Draw control chart for fraction defective and comment on the state of control of the process.

UNIT – V

10   Derive the formula for the probability distribution density function of the waiting time distribution.

OR

11   Suppose there are 3 typists in a typing pool. Each typist can type an average of 6 letters/hr. If letters arrive to be typed at the rate of 15 letters/hr, find: (i) The fraction of time all the three typist are busy. (ii) The average number of letters waiting to be typed.

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PROBABILITY & STATISTICS
(Common to CE, CSE, IT and ME)

Time: 3 hours

Max. Marks: 70

PART – A
(Compulsory Question)
*****

1   Answer the following: (10 X 02 = 20 Marks)
- (a) If the probability that a communication system will have high fidelity is 0.81 and the probability that it will have high fidelity and high selectivity is 0.08, what is the probability that a system with high fidelity will also have high selectivity?
- (b) At a checkout counter customers arrive at an average of 1.5 per minute. Find the probabilities that in any given minute of time (i) At most 4 will arrive.
- (c) Explain the level of significance.
- (d) What is the formula of T distribution double mean?
- (e) Define population and sample.
- (f) What is testing? What is the purpose of testing?
- (g) Define statistical quality control.
- (h) What is the R-Chart?
- (i) Explain M/M/N/FCFS.
- (j) Define contingency table.

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

UNIT – I

2   (a) During one stage in the manufacturing of integrated circuit chips, a coating must be applied. If 70% of chips received a thick enough coating, find the probabilities that among 15 chips: (i) At least 12. (ii) At most 6. (iii) Exactly 10 chips, will have thick enough coatings.
   (b) In a distribution of normal, 7% of items are under 35 and 89% are under 63. What are the mean and standard deviation of the distribution?

OR

3   (a) The probability function of a variate X is:

X	0	1	2	3	4	5	6	7
P(x)	0	k	2k	2k	3k	K^2	$2K^2$	$K + 7 K^2$

Find k, and P(X<6).
   (b) If 0.8% of the fuses delivered to an arsenal are defective, use the Poisson approximation to determine the probability that 4 fuses will be defective in a random sample of 400.

UNIT – II

4   In a labor management discussion, it was brought up that workers at a certain large plant take on the average 32.6 minutes to get to work. If a random sample of 60 workers took on the average 33.8 minutes with a standard deviation of 6.1 minutes, can we reject the null hypothesis $\mu > 32.6$ in favour of the alternative hypothesis $\mu > 32.6$ at the 0.0 level of significance?

OR

5   To test the claim that the resistance of electric wire can be reduced by more than 0.050ohm by alloying, 32 values obtained for standard wire yielded a mean of 0.136om and a s.d. of 0.004ohm and 32 values obtained for alloyed wire yielded a mean of 0.083ohm with a s.d. of 0.005ohm. At the 0.05 level of significance does this support the claim?

Code: 15A54401

UNIT – III

6. Suppose that we want to investigate whether on the average men earn more than $20 per week than women in a certain industry. If sample data show that 60 men earn on the average per week with a standard deviation of s1 = $15.60, while 60 women earn on the average per week with a standard deviation of s2 = $18.20, what can we conclude at the 0.01 level of significance.

OR

7. Memory capacity of 10 students were tested before and after training. State whether the training was effective or not from the following scores.

Before training	12	14	11	8	7	10	3	0	5	6
After training	15	16	10	7	5	12	10	2	3	8

UNIT – IV

8. (a) What are the differences between control charts for variables and control charts for attributes?
    (b) List out the ways of plotting P-chart. Explain the construction and operation of C-chart.

OR

9. Explain the use of descriptive statistics in measuring quality characteristics.

UNIT – V

10. Assume that both arrival rate and service rate following poission distribution. The arrival rate and service rate are 25.35 customer/hours respectively at a single window in RTC reservation counter. Find: (i) Ls. (ii) Lq (Ws).

OR

11. Discuss Queuing theory with applications.

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Code: 15A54401

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B.Tech II Year II Semester (R15) Regular Examinations May/June 2017
PROBABILITY & STATISTICS
(Common to CE, CSE, IT and ME)

Time: 3 hours

Max. Marks: 70

PART – A
(Compulsory Question)
(Use of statistical tables is permitted in the examination hall)
*****

1   Answer the following: (10 X 02 = 20 Marks)
(a)   Define: (i) Independent event. (ii) Conditional probability.
(b)   For the continuous probability function $f(x) = Kx^2 e^{-x}$ when $x > 0$, find K.
(c)   Among 900 people in a state 90 are found to be chapatti eaters. Construct 99% confidence interval for the true population.
(d)   The test statistic to test the significance of difference between two sample proportions, in case of large samples is -------
(e)   Find $\rho(t < 2.365)$ when $v = 7$.
(f)   Define contingency table.
(g)   Define chance cause, assignable cause.
(h)   What are control limits for C-chart?
(i)   What is the probability that there are n or more customers in the system?
(j)   Give general structure of a queueing system.

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

UNIT – I

2   Find the mean and variance of the uniform probability distribution given by $f(x) = \frac{1}{n}$ for $x = 1,2,3 \ldots \ldots, n$.

OR

3   The marks obtained in statistics in a certain examination found to be normally distributed. If 15% of the students $\geq$ 60 marks, 40% $\leq$ 30 marks, find the mean and standard deviation.

UNIT – II

4   20 people were attacked by a disease and only 18 survived will you reject the hypothesis that the survival rate if attacked by this disease is 85% in favour of the hypothesis that is more at 5% level.

OR

5   A random sample of 300 shoppers at a super market includes 204, who regularly use cents off coupons. In another sample of 500 shoppers at a super market includes 75, who regularly use cents off coupons. Test the significance difference of two proportions at 2% level. Construct confidence interval for the probability that any one shopper in sample selected at random will use regularly cents off coupons.

UNIT – III

6   Memory capacity of 10 students were tested before and after training. State whether the training was effective or not from the following scores.

Before training	12	14	11	8	7	10	3	0	5	6
After training	15	16	10	7	5	12	10	2	3	8

OR

7   The measurements of the output of two units have given the following results. Assuming that both samples have been obtained from the normal populations 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

Code: 15A54401

UNIT – IV

8. The following are the sample means and ranges for ten samples each of size 5. Construct the control chart for mean and range and comment on the nature of control.

Sample No	1	2	3	4	5	6	7	8	9	10
Mean	12.8	13.1	13.5	12.9	13.2	14.1	12.1	15.5	13.9	14.2
Range	2.1	3.1	3.9	2.1	1.9	3.0	2.5	2.8	2.0	2.5

OR

9. The number of defects on 20 items are given below.

Item no	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Number of defects	2	0	4	1	0	8	0	1	2	0	6	0	2	1	0	3	2	1	0	2

Devise a suitable control scheme and draw control charts for the future.

UNIT – V

10. Derive variance of n, where 'n' is the number of customers in the system.

OR

11. Cars arrive at a petrol pump with exponential interval times having mean ½ minute. The attendant takes an average of $1/5$ minutes per car to supply petrol. Service rate being exponentially distributed. Find: (i) The average number of cars waiting to be served. (ii) The average number of cars in the system.

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Code: 15A54401

$\boxed{\text{R15}}$

B.Tech II Year II Semester (R15) Regular & Supplementary Examinations May/June 2018
PROBABILITY & STATISTICS
(Common to CE, CSE, IT and ME)

Time: 3 hours

Max. Marks: 70

PART – A
(Compulsory Question)
*****

1   Answer the following: (10 X 02 = 20 Marks)
  (a) What is the probability of getting an even number in the throw of a die?
  (b) In a binomial distribution consisting of 5 independent trails, probabilities of 1 and 2 successes are 0.4096 and 0.2048 respectively. Find the parameter 'p' of the distribution.
  (c) Explain the critical region and accepting region.
  (d) What is the formula of Z distribution double mean.
  (e) Define small and large sample.
  (f) What is testing? What is the purpose of testing?
  (g) Define statistical quality control.
  (h) What is the R-chart?
  (i) Explain M/M/1.
  (j) Define contingency table.

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

$\boxed{\text{UNIT – I}}$

2 (a) The mean and variance of a binomial distribution are 4 and (4/3) respectively. Find $P(X \geq 1)$.
  (b) The heights of 1000 students are normally distributed with a mean of 174.5 cm and a standard deviation of 6.9 cm. Assuming that the heights are recorded to the nearest half-cm, how many of these students would you expect to have heights: (i) Less than 160.0 cms? (ii) Between 171.5 and 182.0 cms inclusive? (iii) Greater than or equal to 188.0 cms.

OR

3 (a) The probability function of a variate X is:

X	0	1	2	3	4	5	6
P(x)	K	3k	5k	7k	9k	11k	13k

Find k, mean and variance.
  (b) At a checkout counter customers arrive at an average of 1.5 per minute. Find the probabilities that in any given minute of time: (i) At most 4 will arrive. (ii) Exactly 4 will arrive. (iii) At least 4 will arrive.

$\boxed{\text{UNIT – II}}$

4   An ambulance service claims that it takes on the average 8.9 minutes to reach its destination in emergency calls. To check this claim, the agency which licenses ambulance services has them timed on 50 emergency calls, getting a mean of 9.3 minutes with a standard deviation of 1.6 minutes. What can they conclude at the level of significance of 0.05?

OR

5   To test the claim that the resistance of electric wire can be reduced by more than 0.050 ohm by alloying, 32 values obtained for standard wire yielded a mean of 0.136 ohm and a s.d of 0.004 ohm and 32 values obtained for alloyed wire yielded a mean of 0.083 ohm with a s.d of 0.005 ohm. At the 0.05 level of significance does this support the claim?

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R15

UNIT – III

6   To compare the two kinds of bumper guards, 6 of each kind were mounted on a certain kind of compact car. Then each car was run into a concrete wall at 5 miles per hour and the following are the cost of the repairs.

        Bumper guard 1 : 107 148 123 165 102 119

        Bumper guard 2 : 134 115 112 151 133 129

Use the 0.01 level of significance to test whether the difference between the means of these two samples is significant.

OR

7   To determine whether there really is a relationship between an employee's performances in the company's training programme and his or her ultimate success in the job, the company takes a sample of 400 cases from its very extensive files and obtained the results shown in the following table.

		Performance in training program			
		Below average	Average	Above average	Total
Success in job	Poor	23	60	29	112
	Average	28	79	60	161
	Very good	9	49	63	121
	Total	60	188	152	400

UNIT – IV

8   (a)   What are the differences between control charts for variables and control charts for attributes?

   (b)   List out the ways of plotting P-chart. Explain the construction and operation of C-chart.

OR

9   Explain the use of descriptive statistics in measuring quality characteristics.

UNIT – V

10   A TV repair man finds that the time spent on his jobs has an exponential distribution with mean 30 minutes. He repair sets in the order in which they arrive. The arrival of the sets is approximately Poisson with an average of 10 per an eight hour day. Find the repairman's idle time each day. How many jobs are head of the average set just brought in?

OR

11   Explain about queuing theory characteristics.

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