

Code No: 56086

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech III Year II Semester Examinations, April - 2018

PROBABILITY AND STATISTICS

(Bio-Technology)

Time: 3 hours

Max. Marks: 75

Answer any five questions
All questions carry equal marks

- 1.a) If A and B are any two events, then prove that
 $P(A \cup B) = P(A) + P(B) - P(A \cap B)$
- b) In a certain town 40% have brown hair, 25% have brown eyes and 15% have both brown hair and brown eyes
 A person is selected at random from the town.
 i) If he has brown hair, what is the probability that he has brown eyes?
 ii) If he has brown eyes, what is the probability that he does not have brown hair? [7+8]
- 2.a) A continuous Random variable has the p.d.f

$$f(x) = \begin{cases} Kxe^{-\lambda x} & \text{If } x \geq 0, \lambda \geq 0 \\ 0 & \text{otherwise} \end{cases}$$

 Determine i) K ii) The mean iii) variance.
- b) The probability that a man hitting a target is $1/3$. If he fires 6 times, find the probability that he fires
 i) At the most 5 times
 ii) Exactly once
 iii) At least two times. [7+8]
- 3.a) If the variance of a Poisson variate is 2, find the probability that
 i) $x=0$ ii) $1 < x < 4$ iii) $0 < x < 3$
- b) Suppose that the weights of 800 male students are normally distributed with mean $\mu = 140$ pounds with a standard deviation of 10 pounds. Find the number of students whose weight are
 i) Between 138 and 148
 ii) More than 152. [7+8]
4. A population consists of six numbers 4, 8, 12, 16, 20, 24. Consider all Samples of size two which can be taken without replacement from this population. Find
 a) The population mean
 b) The population Standard deviation
 c) The mean of the sampling distribution of mean
 d) Standard deviation of the sampling distribution of mean. [15]
- 5.a) A sample of size 81 was taken whose variance is 20.25 and mean 32. Construct 95% confidence interval for the mean
- b) A lady stenographer claims that she can take the dictation at the rate of 118 words per minute. Can we reject our claim on the basis of 100 trials in which she demonstrates a mean of 112 words with a S.D of 10 words? [7+8]

- 6.a) In a city 250 men out of 750 men were found to be smokers. Does this information support the conclusion that the majority of men in this city are smokers?
- b) A sample of 900 members has a mean 3.4 cms and S.D 2.81 cms another sample of 500 members has a mean 4.2 cms and S.D 2.1 cms Test the difference between the means. [8+7]
7. A story writer is bringing out a new story book. He wants to determine whether the story will appeal to a particular age group or to all age groups. He takes a random sample of 200 and got their opinion as follows. Use χ^2 test to test whether opinion of the story age group. [15]

Age group opinion.	Below 20	20-39	40-59	60 and above
Liked the story	35	30	15	20
Dislike the story	15	20	5	20
Indifferent	10	5	10	15

8. A fast food restaurant has one drive window. Cars arrive according to a poisson process. Cars arrive at the rate of 2 per 5 minutes. The service time per customer is 1.5 minutes. Determine
- The Expected number of customers waiting to be served.
 - The probability that the waiting line exceeds 10
 - Average waiting time until a customer reaches the window to place an order.
 - The probability that the facility is idle.
- [15]

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30-04-2018