

Code No: 53014

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD

B.Tech II Year I Semester Examinations, May/June - 2015

PROBABILITY AND STATISTICS

(Common to ME, CSE, AME, MIE, MSNT)

Time: 3 hours

Max. Marks: 75

Answer any five questions
All questions carry equal marks

- 1.a) The odds that a book will be received favourably by three independent critics are 5 to 2, 4 to 3 and 3 to 4. What is the probability that of the three receives a majority will be favourable.
- b) In a certain college 25% of boys and 10% of girls are studying mathematics. The girls constitute 60% of the student body. i) What is the probability that mathematics is being studied? ii) If a student is selected at random and is found to be studying mathematics. Find the probability that the subject is a girl? iii) a boy? [7+8]
- 2.a) Out of 800 families with '5' children each, how many families would be expected to have
- Three boys and two girls.
 - Two boys and three girls
 - One girl
 - At the most two girls,
- under the assumption that probabilities for boys and girls are equal.
- b) For a normally distributed variate X with mean 1 and standard deviation 3, find out the probability that
- $3.43 \leq x \leq 6.19$
 - $-1.43 \leq x \leq 6.19$
- [7+8]
- 3.a) In IIT joint entrance test, the score showed $\mu = 64$ and $\sigma = 8$. How large a sample of candidates appearing in the test must be taken in order that there be a 10% chance that its mean score is less than 62%.
- b) Out of 650 truck drivers, 40 were found to have consumed alcohol more than the legal limit. Find 95% confidence interval for the true proportion of drivers who were over the limit during the time of test. [7+8]
- 4.a) If 57 out of 150 patients suffering with certain disease are cured by allopathy and 33 out of 100 patients with same disease are cured by homeopathy. Is there any reason to believe that allopathy is better than homeopathy at 5% Level of Significance.
- b) If 48 out of 400 persons in rural area possessed 'cell phones' while 120 out of 500 in urban areas. Can it be accepted that the proportion of 'cell phones' in the rural and urban area is same or not. Use 5% of Level of Significance. [7+8]

5. In a locality 100 person were randomly selected and asked about their academic qualifications. The results are as given below

Education				
Sex	Middle standard	High School	Graduation	Total
Male	10	15	25	50
Female	25	10	15	50
Total	35	25	40	100

Can you say that education depends on sex? [15]

- 6.a) Find the lines of regression for price (x) and supply (y) from the following data. Also estimate the supply when price is 16 units.

$$\Sigma x = 130, \Sigma y = 220, \Sigma x^2 = 2288, \Sigma y^2 = 5506 \text{ and } \Sigma xy = 3467, n = 10.$$

- b) Calculate the rank correlation, coefficient from the following data of marks obtained by 10 students. [7+8]

Marks in physics	78	36	98	25	75	82	90	62	65	39
Marks in mathematics	84	51	91	60	68	62	86	58	63	47

7. The arrival of cars is Poisson with a mean rate of 10 per hour. The length of time each car spends in the car park has negative exponential distribution with mean 20 per hour.

a) How many cars are there in the car parking on average?

b) Find the waiting time in the queue.

c) Find the probability that there are more than 4 cars in the system. [5+5+5]

- 8.a) The transition probability matrix of a Markov chain $\{X_n\}; n = 1, 2, 3, \dots$ having

three states 1, 2 and 3 is $P = \begin{bmatrix} 0.1 & 0.5 & 0.4 \\ 0.6 & 0.2 & 0.2 \\ 0.3 & 0.4 & 0.3 \end{bmatrix}$ and the initial distribution is

$$P^{(0)} = (0.7, 0.2, 0.1).$$

Find i) $P\{X_2=3\}$,

ii) $P\{X_3=2, X_2=3, X_1=3, X_0=2\}$

- b) Three boys A, B and C are throwing a ball to each other. A always throws the ball to B and B always throws the ball to C; but C is just as likely to throw the ball to B as to A. Show that the process is Markovian. Find the transition matrix and classify the states. Do all the states are ergodic? [7+8]

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