



PRESIDENCY UNIVERSITY, BENGALURU
SCHOOL OF ENGINEERING

Max Marks: 30

Max Time: 55 Minutes

Weightage: 15 %

Set A

TEST 3

II Semester 2016-2017

Course: MATH A 102 Probability and Statistics

21 April 2017

Instructions:

- i. Write legibly.
- ii. Scientific and non-programmable calculators are permitted.

Part A

(3Q x 4M = 12 Marks)

1. The probability that a patient recovers from a blood disease is 0.4. If 15 people are known to have contracted the disease, what is the probability that from 3 to 8 survive?
2. A sampling plan involves sampling independently 10 items from a lot of 100 items in which 12 are defective. The distribution of the number of defective items is a hypergeometric random variable. What is the probability that exactly 3 are defective in the sample?
3. At a busy time, callers have difficulty placing their phone calls. Suppose that $p = 0.05$ is the probability of a connection during a busy time. What is the probability that 5 attempts are necessary for a successful call?

Part B

(2Q x 5M = 10 Marks)

4. The probabilities are 0.4, 0.2, 0.3, and 0.1, respectively, that a delegate to a certain convention arrived by air, bus, automobile, or train. The distribution of the number of delegates follows a multinomial experiment. What is the probability that among 9 delegates randomly selected at this convention, 3 arrived by air, 3 arrived by bus, 1 arrived by automobile, and 2 arrived by train?
5. An electrical firm manufactures light bulbs that have a life, before burn-out, that is normally distributed with mean equal to 800 hours and a standard deviation of 40 hours. Find the probability that a bulb burns between 778 and 834 hours.

Part C

(1Q x 8M = 8 Marks)

6. An automobile manufacturer is concerned about a fault in the braking mechanism of a particular model. The fault can, on rare occasions, cause a catastrophe at high speed. The distribution of the number of cars per year that will experience the catastrophe is a Poisson random variable with mean $\lambda = 5$. (a) What is the probability that at most 3 cars per year will experience a catastrophe? (b) What is the probability that more than 1 car per year will experience a catastrophe?



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TEST 2

II Semester 2016-2017 Course: MATH A 102 Probability and Statistics

24 March 2017

Instructions:

- i. Write legibly.
- ii. Scientific and non-programmable calculators are permitted.

Part A

(5Q x 2M = 10 Marks)

1. A shipment of 7 television sets contains 2 defective sets. A hotel makes a random purchase of 3 of the sets. If X is the number of defective sets purchased by the hotel, find the probability distribution of the random variable X .
2. The probability distribution of a random variable X is given by

x	0	1	2	3	4
$f(x)$	0.41	0.37	0.16	0.05	0.01

Compute the cumulative distribution function of X .

3. For the density function $f(x) = \begin{cases} k\sqrt{x}, & 0 < x < 1 \\ 0, & \text{elsewhere.} \end{cases}$ (a) Evaluate k (b) Evaluate $P(0.3 < X < 0.6)$.

4. An attendant at a car wash is paid (in dollars) according to the number of cars that pass through. Suppose the probabilities are $1/12, 1/12, 1/4, 1/4, 1/6$, and $1/6$, respectively, that the attendant receives \$7, \$9, \$11, \$13, \$15 and \$17. Find the attendant's expected earnings.
5. Let X be a random variable with the following probability distribution

x	-2	3	5
$f(x)$	0.3	0.2	0.5

Find the standard deviation of X .

Part B

(2Q x 5M = 10 Marks)

6. From a sack of fruits containing 3 oranges, 2 apples and 3 bananas, a random sample of 2 fruits is selected. If X is the number of oranges and Y is the number of apples in the sample, find (a) the joint probability distribution of X and Y ; (b) $P[(X, Y) \in A]$, where A is the region $\{(x, y) | x + y \leq 1\}$.
7. For the joint density function $f(x, y) = \begin{cases} x(1+3y^2)/4, & 0 < x < 2, 0 < y < 1 \\ 0, & \text{elsewhere} \end{cases}$, find the marginal distributions $g(x), h(y)$ and the conditional distribution $f(x/y)$.

Part C

(1Q x 10M = 10 Marks)

8. Find the covariance σ_{XY} of the random variables X and Y having the joint probability density

$$f(x, y) = \begin{cases} x + y, & 0 < x < 1, 0 < y < 1 \\ 0, & \text{elsewhere.} \end{cases}$$



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TEST I

II Semester 2016-2017 Course: MATH A 102 Probability and Statistics

25 February 2017

Instructions:

- i. Write legibly.
- ii. Scientific and non-programmable calculators are permitted.

Part A

(5Q x 2M = 10 Marks)

1. List the elements of the sample space of the set of outcomes when a coin is tossed until a tail or three heads appear.
2. In how many ways can 7 graduate students be assigned to 1 triple and 2 double hotel rooms during a conference?
3. The probability that an American industry will locate in Shanghai, China, is 0.7, the probability that it will locate in Beijing, China is 0.4, and the probability that it will locate in either Shanghai or Beijing or both is 0.8. What is the probability that the industry will locate in both cities?
4. If the probabilities that a person purchasing a new automobile will choose the colour green, white, red or blue are, respectively, 0.09, 0.15, 0.21 and 0.23, what is the probability that a buyer will purchase a new automobile that comes in one of those colours?
5. A fuse box contains 20 fuses, of which 5 are defective. If 2 fuses are selected at random and removed from the box in succession without replacing the first, what is the probability that both fuses are defective?

Part B

(2Q x 5M = 10 Marks)

6. If 3 books are picked at random from a shelf containing 5 novels, 3 books of poems, and a dictionary, what is the probability that (a) the dictionary is selected? (b) 2 novels and 1 book of poems are selected?
7. The probability that a married man watches a certain television show is 0.4 and the probability that a married woman watches the show is 0.5. The probability that a man watches the show, given that his wife does, is 0.7. Find the probability that (a) a married couple watches the show (b) a wife watches the show given that her husband does (c) at least one member of a married couple will watch the show.

Part C

(1Q x 10M = 10 Marks)

8. (a) State the Bayes rule of probability.
(b) In a certain factory, three machines M_1 , M_2 and M_3 , make 30%, 45% and 25% of the products respectively. It is known that 2%, 3% and 2% of the products made by each machine, respectively, are defective. Suppose that a finished product is randomly selected. (i) What is the probability that the selected product is defective? (ii) If the randomly selected product is found to be defective, what is the probability that it is made by machine M_3 ?