Presidency University, Bengaluru
School of Engineering

I Semester 2015-2016   Test 1   Course: **MATH A 102 Probability and Statistics**

(mu)   (Closed Book)

Max Marks: 30   Max Time: 50 Min   Weightage: 15 %   9th Nov' 2015   **Set C**

2 Dec 2015

Instructions to Candidates
1. Write legibly
2. Use of scientific calculator permitted
3. Assume suitable data wherever necessary and justify the same.


Part A (5 x 2 = 10 Marks)

1. Differentiate percentage and percentiles.

2. Photography is hobby of Prasad. He has 10 photos of wild life, 5 photos of sports, 6 photos of buildings, and 8 photos of people. If one from each category is to be selected to showcase in college event, in how many possible ways Prasad can select his photographs?

3. Plot a Ogive graph for the results of P&S test 1 marks shown in table below.

Range of marks	0-9	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90-99
Frequency	1	1	2	9	20	26	22	10	4	1

4. Create stem-leaf display for the given data 16.5, 23.6, 9.4, 8.5, 12.6, 27.3, 34.5, 23.3, 25.8, 13.0, 45.0, 12.7

5. A manufacturer has five seemingly identical computer terminals available for shipping. Unknown to her, two of the five are defective. A particular order calls for two of the terminals and is filled by randomly selecting two of the five that are available. List the sample space for this experiment.

Part B (3 x 4 = 12 Marks)

6. The tree diagram to find the sample space of family having three children is given below.
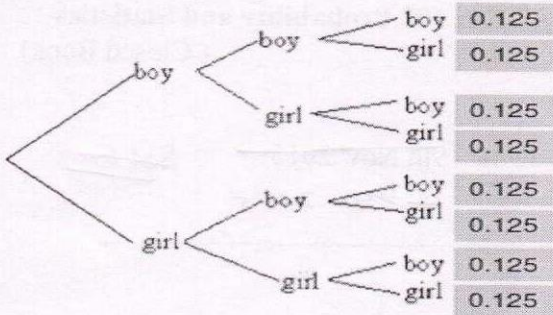
(Probability of each possibility is given in the tree)

a. Write the event E1 that the family has atleast 2 boy child or exactly 2 girl child and find P(E1).

b. Write the event E2 that the family has no 2nd boy or no 3rd girl and find P(E2).

7. Consider the following table w.r.t Body weight and Hypertension of a human.

	Overweight	Underweight	Normal Weight
Hypertension	0.10	0.02	0.08
Non Hypertension	0.15	0.20	0.45

a. What is the Probability a randomly selected person is normal weight?

b. A randomly selected person is non hypertension. What is the probability that the person is normal weight?

8. In India, the car number plate is formed by 3 letters from the alphabet followed by 4 digits from the digits 1, 2, 3, 4, 5, 6, 7, 8 and 9. How many number plates can be formed if neither the digits nor the letters are repeated?

Part C (1 x 8 = 8 Marks)

9. The depth of ground water is given in the following grouped data table.

Distance from ground to water level (ft), x	15-19	20-24	25-29	30-34
Number of wells, f	3	5	8	4

a. Estimate the mean depth of the ground water.

b. Estimate the sample standard deviation for the depth of the ground water.

c. Estimate the coefficient of variation for this data.

Presidency University, Bengaluru
School of Engineering

I Semester 2015-2016   Test 2   Course: **MATH A 102 Probability and Statistics**

(Closed Book)

Max Marks: 30   Max Time: 50 Min   Weightage: 15 %   28th Dec' 2015   **Set A**

Instructions to Candidates
1. Write legibly
2. Use of scientific calculator permitted
3. Assume suitable data wherever necessary and justify the same.

PART A (2 X 3 = 6 Marks)

Q1.   Give Bayes's formula for 2 events A and B

Q2.   Check whether the function can define probability: $f(x) = (5-x^2)/6$. for x= 0,1,2,3.

Justify.

PART B (2 X 7 = 14 Marks)

Q3.   A company buys batches of n components. Before a batch is accepted, m of the components are selected at random from the batch and tested. The batch is rejected if more than d components in the sample are found to be below standard. Find the probability that a batch which actually contains six below-standard components is rejected when $n = 20$, $m = 5$ and $d = 1$

Q4.   If you buy a lottery ticket in 50 lotteries, in each of which your chance of winning a prize is 1/100, what is the probability (using Poisson approximation) that you will win a prize

a) atleast once b) exactly once ?

PART C (1 X 10 = 10 Marks)

Q5.   While watching football game between the section3 and section 2, you observe that someone is clearly supporting section 2 in the game. What is the probability that they were actually belong to section 2 given that they support section 2 team? Assume that:

- The probability that a randomly selected student belong to section 2 is 1/20.
- The chance that a student belong to section 2 and he support section 2 team is 7/10.
- The probability that a student does not belong to section 2 and he support section 2 team is 1/10.

Hint: Let B be the event that a student belong to section 2 and U be event that the student support section 2. Find P(B/U) using Bayes' Rule.

Presidency University, Bengaluru
School of Engineering

I Semester 2015-2016   Test 2   Course: **MATH A 102 Probability and Statistics**

(Closed Book)

Max Marks: 30   Max Time: 50 Min   Weightage: 15 %   28th Dec' 2015   **Set B**

Instructions to Candidates
1. Write legibly
2. Use of scientific calculator permitted
3. Assume suitable data wherever necessary and justify the same.

PART A (2 X 3 = 6 Marks)

Q1.   State law of total probability

Q2.   Check whether the function can define probability: $f(x) = (x+1)/25$. for x=1,2,3,4,5

Justify.

PART B (2 X 7 = 14 Marks)

Q3   A company buys batches of n components. Before a batch is accepted, m of the components are selected at random from the batch and tested. The batch is rejected if more than d components in the sample are found to be below standard. Find the probability that a batch which actually contains nine below-standard components is rejected when $n = 30$, $m = 10$ and $d = 1$.

Q4   If you buy a lottery ticket in 50 lotteries, in each of which your chance of winning a prize is 1/100, what is the (using Poisson approximation) probability that you will win a prize atleast twice?

PART C (1 X 10 = 10 Marks)

Q5   As a chief warden of university hostel, I observed that some students in hostel do not like the food served in hostel. What is the probability that they belong to school of engineering (SOE) given that they do not like hostel food? Assume that:

•   The probability the randomly selected student belong to SOE is 2/40.
•   The chance that a student belong to SOE and does not like hostel food is 14/20.
•   The probability that a student does not belong to SOE and he does not like hostel food is 2/20.

Hint: Let B be the event that a student belong to SOE and U be event that the student does not like hostel food. Find P(B/U) using Bayes' Rule.

Presidency University, Bengaluru
School of Engineering

I Semester 2015-2016   Test 2   Course: **MATH A 102 Probability and Statistics**

(Closed Book)

Max Marks: 30   Max Time: 50 Min   Weightage: 15 %   28th Dec' 2015   **Set C**

Instructions to Candidates
1. Write legibly
2. Use of scientific calculator permitted
3. Assume suitable data wherever necessary and justify the same.

PART A (2 X 3 = 6 Marks)

Q1   Give one step process for computing binomial probability $b(x;n,p)$ using cumulative probability $B(x;n,p)$.

Q2   Check whether the function can define probability: $f(x) = (3-x^2)/4$. for $x = 0,1,2$.

Justify.

PART B (2 X 7 = 14 Marks)

Q3   Suppose that a batch of 30 items contains 4 that are defective and 26 that are non-defective. If X is the number of defective items in a randomly drawn sample of 10 items from the batch, construct the probability histogram.

Q4   The monthly worldwide average number of airplane crashes of commercial airlines is 3.5.

What is the probability that there will be at least 2 such accidents in the next month?

PART C (1 X 10 = 10 Marks)

Q5   Around 300 students attend the robotic work shop organized in the Presidency University.

Out of which 48 students were selected for national level competition. It is observed that 138 students belong to section 02. Twenty-seven students who got selected for national level competition belong to section02. What is the probability that a student who got selected for national level competition belong to section02?

Hint: Let A be the event that a student got selected to national level competition and B be event that the student belong to section 02. Find P(A/B) using Bayes' Rule.

I Semester 2015-2016	COMPREHENSIVE EXAMINATION	Course: MATH A 103 Probability and Statistics (Closed Book)
Max Marks:60	Max Time: 2 hours	Weightage: 30 % 4th Jan' 2016 **SET A**

Instructions to Candidates
1. Write legibly.
2. Attempt all questions.
3. Use of scientific calculators is permitted
4. Assume any missing data suitably and clearly state and justify the same

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PART A (4 X 2 = 8 Marks)

Q1. The stem and leaf plot is given below: Find mean, median, mode.

10	3, 9, 0
11	
12	5,6,2,9
13	2,7,8,8,5
14	4,0,6
15	8,1
16	2

Q2. Twenty students in a probability and statistics class were asked to report the number of pets in their families, giving the following data: 3, 3, 2, 4, 1, 0, 1, 2, 3, 5, 1, 2, 2, 1, 1, 0, 2, 4, 3, 1 Draw histogram.

Q3. Suppose that you measure the length, l, of a cylinder. From 5 trials, you have the following data:

Trial	Length l
1	1.52
2	1.56
3	1.48
4	1.50
5	1.54

Compute the sample standard deviation

Q4. In a class there are:
- 8 students who play football and hockey
- 7 students who do not play football or hockey
- 13 students who play hockey
- 19 students who play football

Draw a Venn diagram. How many students are there in the class?

PART B (4 X 5 = 20 Marks)

Q5. In a hospital unit there are 8 nurse and 5 physicians; 7 nurse and 3 physicians are females. If a staff person is selected, find the probability that the staff is a nurse or a male.

Q6. You are trying to reserve 5 berths in train to go home. You are looking for 1 middle, 2 lower and 2 upper berths. The berth availability in train are as follows: 2 middle berths, 5 lower berths, and 4 upper berths. In how many different ways you get the desired combination of berths?

Q7. The probability of 6 flights (f1-f6) arriving late to Delhi airport due to fog are 0.07, 0.12, 0.17, 0.32, 0.21 and 0.11. What are the probability that
(a) f1, f3, f5 or f6 arrive late.

(b) f2, f4 or f6 arrive late.

Q8. Prasad is taking a 3 question quiz. His chance of correctly answering each question is 0.9. Use tree diagram to determine the probability that Prasad will have 0,1,2,3 correct answers.
a) Complete the table:

X	0	1	2	3
P(x)				

b) Find expected value and standard deviation.

PART C (4 X 8 = 32 Marks)

Q9. a) A television director is scheduling a certain sponsor's commercials for an upcoming broadcast.
There are six slots available for commercials. In how many ways may the director schedule the commercials, If the sponsor has three different commercials, the first of which is to be shown three times, the second two times, and the third once?

b) A cricket fan has a pair of tickets to 6 different IPL games. If the fan has five friends who like cricket, how many ways may he take one of them along to each of the six games?

Q10. A public health researcher examines the medical records of a group of 937 men who died in 2015 and discovers that 210 of the men died from causes related to heart disease. Moreover, 312 of the 937 men had at least one parent who suffered from heart disease, and, of these 312 men, 102 died from causes related to heart disease. Determine the probability that a man randomly selected from this group died of causes related to heart disease, given that neither of his parents suffered from heart disease.
Hint 1: Let A be set of group died due to heart disease and set B be group whose parent had heart disease. Find P(A/B').
Hint 2: $P(A \cap B') = P(A) - P(A \cap B)$

Q11. Five individuals from an animal population thought to be near extinction in a certain region have been caught, tagged and released to mix into the population. After they have had an opportunity to mix in, a random sample of 10 of these animals is selected. Let Y = the number of tagged animals in the second sample. If there are actually 25 animals of this type in the region,
Find: a) P(Y=2)   b) P(Y≤ 2)

Q12. a) A typical page in a book contains one typo per page. What is the probability that there are exactly 8 typos in a given 10-page chapter?
) Suppose that every page in the chapter contains exactly 30 characters, and there is still an average of one typo per page. What is the probability that there are exactly 8 typos in the 10-page chapter?

I Semester	COMPREHENSIVE EXAMINATION	Course: MATH A 103 Probability and Statistics
2015-2016		(Closed Book)
Max Marks:60	Max Time: 2 hours	Weightage: 30 % 4th Jan' 2016 **SET B**

Instructions to Candidates
1. Write legibly.
2. Attempt all questions.
3. Use of scientific calculators is permitted
4. Assume any missing data suitably and clearly state and justify the same

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PART A (4 X 2 = 8 Marks)

Q1.   The stem and leaf plot is given below: Find mean, median, mode.

10	8,3, 1
11	4,8
12	5,6
13	1,6,7,7,4
14	3,1,5
15	7,2
16	1

Q2.   Twenty students in a probability and statistics class were asked to report the number of pets in their families, giving the following data: 4, 4, 3, 5, 2, 1, 2, 3, 4,6, 2, 3, 3, 2, 2, 1, 3, 5, 4, 2
Draw Density Histogram.

Q3.   Ten friends scored the following marks in their end-of-year math exam: 23%, 37%, 45%, 49%, 56%, 63%, 63%, 70%, 72% and 82% What was the population standard deviation of their marks?

Q4.   There are 18 cars on a garage forecourt.
- 12 cars are diesels.
- 5 cars are automatics.
- 3 cars are automatic diesels.

Draw Venn diagram. Find out how many cars are not automatic <u>and</u> not a diesel

PART B (4 X 5 = 20 Marks)

Q5.   On New year's Eve, cultural events were organized for students and faculty members separately. There were 16 dance and 10 music events; 14 dance and 6 music events were performed by students. If an event is chosen, find the probability that the event performed is dance or by faculty.

Q6.   In a sweet eating competition, participants are expected to eat any 25 sweets in a given time. There are 15 gulabjamun, 20 laddu, 20 rasgullaand 10 Jalebi. As a participant you decide to eat 7 gulabjamun, 4 laddu, 8 rasgulla and 6 Jalebi. In how many different ways you get the desired combination of sweets?

Q7.   The probability of raining in first 8 months of the year are 0.12, 0.09, 0.11, 0.06, 0.18, 0.02, 0.30, and 0.12. What are the probability of rain in month of
(a) February, April, May orJune.
(b) March, June,July or August.

Q8.   Prasad and Pooja play 3 rounds of chess. The chance that Pooja win a game is is 0.6. Use tree diagram to determine the probability that Pooja will win 0,1,2,3 games.

a) Complete the table:

X	0	1	2	3
P(x)				

b) Find expected value and standard deviation.

PART C (4 X 8 = 32 Marks)

Q9.   a) A television director is scheduling a certain sponsor's commercials for an upcoming broadcast. There are six slots available for commercials. In how many ways may the director schedule the commercials, If the sponsor has three different commercials, each to be shown twice?

b) An art collector, who owns 10 original paintings, is preparing a will. In how many ways may the collector leave these paintings to three heirs?

Q10.   Presidency Group of Institutions admission office receive 2000 application for the year 2016-2017. It is examined that 1200 applications were for Presidency School Bangalore North (PSBN). Moreover, 312 of the 2000 applicants elder sibling (brother or sister) are studying in PSBN and, of these 312 applicants, 102 have applied for PSBN. Determine the probability that an applicant randomly selected from this group has applied for PSBN, given that his/her elder sibling is not studying in PSBN.

Hint1 : Let A be set of applicants applied for PSBN set B be group whose elder sibling is studying in PSBN. Find P(A/B').

Hint 2: P(A∩B')=P(A)- P(A∩B)

Q11.   A company (the producer) supplies microprocessors to a manufacturer (the consumer) of electronic equipment. The microprocessors are supplied in batches of 50. The consumer regards a batch as acceptable provided that there are not more than 5 defective microprocessors in the batch.

Rather than test all of the microprocessors in the batch, 10 are selected at random and tested. Find the probability that out of a sample of 10, y = 0, 1, 2, 3, 4, 5 are defective when there are actually 5 defective microprocessors in the batch.

Suppose that the consumer will accept the batch provided that not more than m *defectives are found in the sample of 10.*

(a) Find the probability that the batch is accepted when there are at most 5 defectives in the batch.

(b) Find the probability that the batch is rejected when there are at most 3 defectives in the batch.

Q12.   a) Ticket collector in train find 2 persons without ticket in a bogie. What is the probability that there are exactly 16 persons without ticket in20bogie train?

Suppose that every bogie contains exactly 60 passengers, and there is still an average of two persons without ticket per bogie. What is the probability that there are exactly 16 persons without ticket in the 20 bogie train?
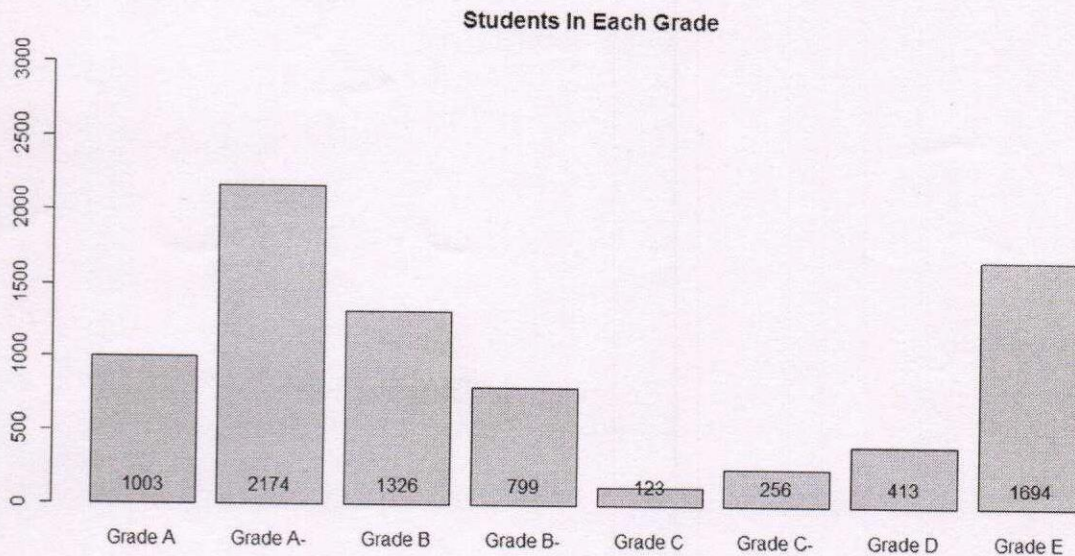
Presidency University, Bengaluru

School of Engineering

Instructions to Candidates
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3. Use of scientific calculator and text book are permitted
4. Assume any missing data suitably and clearly state and justify the same

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1 x 20 = 20 Marks

1. The bar graph below give the number of students in each grades from A to E in Probability and Statistics course. x-axis specifies the Grade of student and Y-axis specifies number of student in each grade.

Students In Each Grade

Grade A	Grade A-	Grade B	Grade B-	Grade C	Grade C-	Grade D	Grade E
1003	2174	1326	799	123	256	413	1694

Answer the following questions:

a) How many students are there in total?   **1 Mark**

b) If the students were evaluated for 200 marks, guess how the instructor in-charge would have created the classes for grading? Construct the frequency distribution table by replicating the grading process shown in bar chart by creating classes of your choice (do not re categorize i.e. Number of students in each grade will remain same).   **4 Marks**

c) Draw the Pareto graph for the class created by you.   **5 Marks**

d) Give the percentage count that how many students scored less than 50 marks, how many students are below 100, how many are above 100 but below 160 and how many scored more than 160 marks. Note: Number may vary according to the classes, you have selected, give closest answer.   **6 Marks**

e) Find the mean of grouped data in the frequency distribution table.   **4 Marks**

Presidency University, Bengaluru
School of Engineering

I Semester 2015-2016   Quiz   Course: **MATH A 103 Probability and Statistics**
(Closed Book)

Max Marks: 20   Max Time: 30 Min   Weightage: 10%   23rd Dec' 2015   **Set A**

Instructions to Candidates
1. Write legibly using pen only.
2. Do not overwrite.
3. Answer in the question paper itself, there will be no separate answer book provided.
4. Enter your ID No. and Section No. in the designated place

14 x 1 = 14 Marks

State true or false for Q1 to Q4 (write T or F)

Q1. A probability distribution function is collectively exhaustive.

Q2. The MODE is the value that half of the entries are below and half of the entries are above.

Q3. The MEDIAN is the average calculated by adding up all the values and dividing by the number of entries.

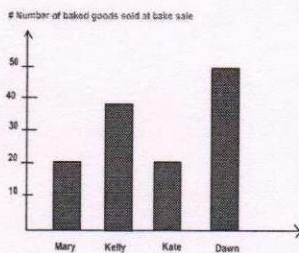Q4. A discrete variable can assume only certain clearly separated values.

Q5.

When the spin is rotated, What is the probability of landing on a even number?

A= 3   B= 1/2   C= 1/6   D =None

Q6. If you have a jar of jellybeans and you have the following colors: 9 red, 12 pink, 2 white, 14 black, 3 orange.

What is the probability that you will pick out a red or white jelly bean? A= 2/9   B= 2/11   C=9/40   D= 11/40
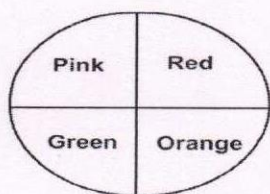
Q7.

Who sold the most baked goods at the bake sale?

A= Mary   B=Kelly   C=Kate   D=Dawn

Q8.

If we spin the spinner 3 times, which of the following   could not be the
outcome?   A= 1 pink, 1 red, 1 orange.   B= 3 pinks.

C= 1 pink, 3 greens   D= 1 orange, 2 red

Q9. A _____ is any function that assigns a numerical value to each possible outcomes.

Q10.　　　For the two events to be collectively exhaustive,

　　a.　$N(A \cup B) = N(S)$　　b. $N(A \cup B) < N(S)$　c. $N(A \cup B) > N(S)$　d. $N(A \cup B) \neq N(S)$

Q11.　　　For the numbers: 4, 10, 13, 16, 20, 28, 30, 37, 40, 43, 49, 50, 58, 60, 65, 68, 70, 74, 75, 80, 88, 90, 93, 96, 100; quartile for the 67th percentile is　　　a. 65　　b. 70　　c. 80　　d. 50

Q12.　　　Pareto diagram is a combination of

　　a. Dot diagram and Frequency Histogram　　　　b. Ogive diagram and X-bar diagram

　　c. Frequency Histogram and Ogive Diagram　　　d. Box plot and X-bar diagram

Q13.　　　In hypergeometric distributions, sampling is done _____ replacement.

Q14.　　　In how many different ways, five people fill five distinct posts.　a. 60　　b. 120.　c. 25　　d. 50

3 x 2 = 6 Marks

Q15.　　　I want to choose a hat for a day. I have 3 orange hats, 2 blue hats, 6 black hats, 1 white hat and 9 red hats. What is the probability that she will not choose a red hat.　A= 9/21　B = 12/21　C= 9/20　D= 12/20

Q16.　　　A student takes a quiz consisting of 5 multiple choice questions. Each question has 4 possible answers. If a student is guessing the answers at random, and the answers to different questions are independent, Find the probability of giving 5 incorrect answers

Q17.　　　Consider the 3 observations 3,7,11. for which the mean is 7 and the standard deviation is 4. If we add 2 to each value, what are the new mean and standard deviation?

　　a) The mean is 9 and the standard deviation is 2.　　　　b) The mean is 9 and the standard deviation is 4.

　　c) The mean is 7 and the standard deviation is 4.　　　　d) The mean is 7 and the standard deviation is 6.

For official use (students shall not write beyond this line) _____

Marks scored out of 20 ☐

Name and Signature of Examiner with Date

Presidency University, Bengaluru
School of Engineering

I Semester 2015-2016   Quiz   Course: **MATH A 103 Probability and Statistics**

(Closed Book)

Max Marks: 20   Max Time: 30 Min   Weightage: 10%   23rd Dec' 2015   **Set B**

Instructions to Candidates
1. Write legibly using pen only.
2. Do not overwrite.
3. Answer in the question paper itself, there will be no separate answer book provided.
4. Enter your ID No. and Section No. in the designated place

14 x 1 = 14 Marks

State true or false for Q1 to Q4 (write T or F)

Q1.   If p is probability of an event A, then p satisfies $= 0 \leq p < 1$.

Q2.   Events A and B are independent if and only if $P[A \text{ intersection } B] = P[A] * P[B]$.

Q3.   A large standard deviation implies that the random variable X is consistent and stable; a small standard deviation is an indication of inconsistency and unpredictability.

Q4.   The random variable T, the time of the peak demand for electricity at a power plant is discrete.

Q5.   Given $P(A) = 0.35, P(B) = 0.4$, and $P(A \cap B) = 0.2$, are A and B are independent?
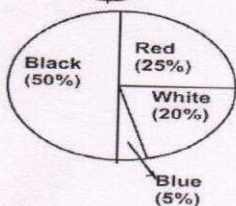
Q6.
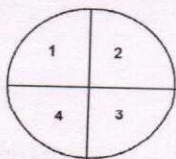
What is the probability of landing on a number less than 4?

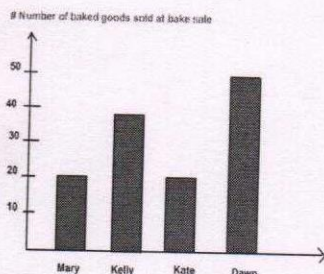A= 3   B= 3/4   C= 1/4   D= None

Q7.

What percent of the population wore blue or white shirts to the school rally?

A= 20%   B= 5%   C= 25%   D= 75%

Q8.

How many baked goods did Mary and Kelly sold together?

A= 20   B= 40   C=50   D=60

Q9.   Outcomes of Bernoulli trials are _____ and _____.

Q10.   A word "PERMUTATION" can be arranged in _____ ways.

Q11. $P(\overline{A} \cup \overline{B}) =$ _____

Q12. Collection, _____, analysis and _____ of numerical data belongs to the domain of statistics.

Q13. _____ command is used to generate integer random numbers in R-tool.

Q14. Which of the following are probability distribution of a random variable;

i. $f(1) = 0.3; f(2) = 0.05; f(3) = 0.4; f(4) = 0.25$

ii. $f(1) = 0.09; f(2) = 0.4; f(3) = 0.3; f(4) = 0.32; f(5) = -0.11$

iii. $f(1) = 0.2; f(2) = 0.3; f(3) = 0.35; f(4) = 0.05$

iv. $f(1) = 0.25; f(2) = 0.25; f(3) = 0.25; f(4) = 0.25$

a. Only (ii)   b. (i) & (iii)   c. (i), (ii) & (iv)   d. (i) & (iv)

3 x 2 = 6 Marks

Q15. A student takes a quiz consisting of 5 multiple choice questions. Each question has 4 possible answers. If a student is guessing the answers at random, and the answers to different questions are independent, Find the probability of giving 5 incorrect answers

Q16. Suppose that events A and B are independent, and that P(A) = 2/10, and P(B) =10/25. What is a) P(A∩B) and b)P(AUB)?

a)_____   b)_____

Q17. We are told that in a random experiment there are five possible outcomes. Which of the following statements is true ?

a) If, after 20 trials, one outcome has not been observed then the probability that it will occur in the next trial is increased.

b) If, after 20 trials, one outcome has been observed more often than the others then the probability that it will not occur in the next trial is increased.

c) If, after 20 trials, one outcome has not been observed then the probability that it will occur in the next trial is unchanged.

d) If the outcomes are equally likely then the trials are independent.

For official use (students shall not write beyond this line)

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Marks scored out of 20 [ ]

Name and Signature of Examiner with Date

ID No.:										

Section No.:		Signature of Invigilator:	

Presidency University, Bengaluru
School of Engineering

I Semester 2015-2016   Quiz   Course: **MATH A 103 Probability and Statistics**
(Closed Book)

Max Marks: 20   Max Time: 30 Min   Weightage: 10%   23rd Dec' 2015   **Set C**

Instructions to Candidates
1. Write legibly using pen only.
2. Do not overwrite.
3. Answer in the question paper itself, there will be no separate answer book provided.
4. Enter your ID No. and Section No. in the designated place

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14 x 1 = 14 Marks

State true or false for Q1 to Q4 (write T or F)

Q1. A certain event is an event which is most likely to happen.

Q2. The probability of a definite event is 100.

Q3. If S is the sample space of a random experiment, then $P(S) = 1$.

Q4. If p is probability of an event A, then p satisfies $= 0 \le p < 1$.

Q5. In hypergeometric distributions, sampling is done _____ replacement.

Q6. After throwing of two dice, what is the probability of getting same number on the face of each dice

   a) $\frac{5}{36}$ b) $\frac{1}{6}$ c) $\frac{1}{36}$ d) $\frac{7}{36}$

Q7. If two events are independent, then

   a. they must be mutually exclusive   b. the sum of their probabilities must be equal to one
   c. their intersection must be zero   d. None of these alternatives is correct

Q8. In how many different ways, five people fill five distinct posts.

   a. 60   b. 120. c. 25   d. 50

Q9. Four coins are tossed simultaneously, in how many ways these coins can show up?

   a. 4   b. 8   c. 16   d.32

Q10.   If $P(A|B) = P(A)$, then

   a. A and B are mutually exclusive   b. A and B are independent
   c. A and B are collectively exhaustive d. None of the above

Q11.   A mixed box of 10 screws contains 5 that are galvanized and 5 that are non-galvanized. Three screws are picked at random without replacement. I want galvanized screws, so consider picking a galvanized screw to be a success. Does the number of successes have a Binomial distribution?

Q12.   Suppose that trucks arrive at a receiving dock with an average arrival rate of 3 per hour. What is the probability exactly 5 trucks will arrive in a two-hour period?
   a) $e^{(-3)}3^5/5!$ b) $e^{(-3)}3^{2.5}/2.5!$ c) $e^{(-5)}5^6/6!$ d) $e^{(-6)}6^5/6!$

Q13.　　　If A and B are the 2 events in a sample space and if they have nothing in common, then the events are called as _____

Q14.　　　Consider the frequency distribution table given below. How would you describe distribution?

Cell Boundary	0 to <0.1	0.1 to <0.2	0.2 to <0.3	0.3 to <0.4	0.4 to <0.5	0.5 to <0.6	0.6 to <0.7	0.7 to <0.8
Frequency	3	5	3	2	6	8	10	2

A= Left Skewed B=Right Skewed C= Symmetrical. D= None

3 x 2 = 6 Marks

Q15.　　　The mean of a sample of n values is $\bar{x}$ and the standard deviation is s. Suppose we add a constant value a, to each observation so that the new data values are $x1+a, x2+a, \ldots, xn+a$. Find the new mean and the new standard deviation.

a) The new mean is $\bar{x}+a$ and the new standard deviation is $s+a$.
b) The new mean is $\bar{x}+a$ and the new standard deviation is s.
c) The new mean is $\bar{x}$ and the new standard deviation is $s+a$.
d) The new mean is $\bar{x}$ and the new standard deviation is s.

Q16.　　　In a production process, one fifth of the articles produced are defective. Ten articles from the production line are randomly selested and inspected. Let X be the number of defective articles in this sample. If the distribution of X is $b(x,n,p)$, what are the values of n and p ?

a) $n=10, p=0.1$　b) $n=10, p=0.2$　c) $n=10, p=1$　d) $n=0.2, p=10$

Q17.　　　Suppose that a quiz consists of 20 True-False questions. A student hasn't studied for the exam and will just randomly guess at all answers (with True and False equally likely). How would you find the probability that the student will get 8 or fewer answers correct?

a).　Find the probability that X=8 in a binomial distribution with n = 20 and p=0.5.
b).　Find the area between 0 and 8 in a uniform distribution that goes from 0 to 20.
c).　Find the probability that X=8 for a normal distribution with mean of 10 and standard deviation of 5.
d).　Find the cumulative probability for 8 in a binomial distribution with n = 20 and p = 0.5.

Presidency University, Bengaluru
School of Engineering

I Semester 2015-2016   Test 1   Course: **MATH A 102 Probability and Statistics**

(Closed Book)

Max Marks: 30   Max Time: 50 Min   Weightage: 15 %   9th Nov' 2015   **Set B**

Instructions to Candidates
1. Write legibly
2. Use of scientific calculator permitted
3. Assume suitable data wherever necessary and justify the same.

Part A (5 x 2 = 10 Marks)

1. Define Co-efficient of variation.

2. In a cultural function audition, Event organizer has to choose the event from the following: 10 songs, 5 Instruments, 5 Dance and 6 Drama. How many possible schedules an event organizer can prepare to organize the function?

3. A police officer has measured the speeds of 100 cars on a mobile speed camera on the hard shoulder of a part of the M60 motorway where the speed limit is 70 mph. The table of results is shown in table below. Construct the Ogive graph.

Speed	50-55	55-60	60-65	65-70	70-75	75-80	80-85	85-90
Frequency	1	5	12	26	25	18	9	4

4. Create stem-leaf display for the given data 0.76, 0.99, 0.82, 0.22, 0.34, 0.25, 0.81, 0.76, 0.93

5. Write sample space (in table format) of the experiment of rolling a die twice. What is the probability of rolling a sum greater than 10.

Part B (3 x 4 = 12 Marks)

6. The tree diagram to find the sample space of family having three children is given below.

		boy	0.125
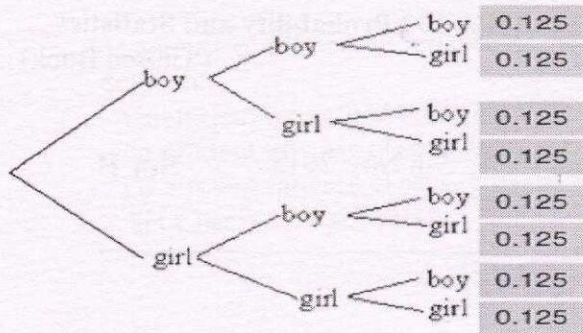
(Probability of each possibility is given in the tree)

a Write the event E1 that the family has 2nd girl child or 1st boy child and find $P(E1)$.

b Write the event E2 that the family has no 2nd girl child or no 1st boy child and find $P(E2)$.

7. Consider the following table w.r.t Body weight and Hypertension of a human

	Overweight	Underweight	Normal Weight
Hypertension	0.10	0.02	0.08
Non Hypertension	0.15	0.20	0.45

a. What is the Probability that a randomly selected person is Underweight?

b. A randomly selected person is non hypertension. What is the probability that the person is underweight?

8. A suitcase contains 6 distinct pairs of socks and 4 distinct pairs of pants. If a traveler randomly picks 2 pairs of socks and then 3 pairs of pants, how many ways can this be done?

Part C (1 x 8 = 8 Marks)

9.Consider the following three data sets A, B and C.

$$A = \{9,10,11,7,13\} \quad B = \{10,10,10,10,10\} \text{ and } C = \{1,1,10,19,19\}$$

a. Calculate the standard deviation of each data set.

b. Compute co-efficient of variance for each set. Which set is more inconsistent?

Instructions to Candidates
1. Write legibly
2. Use of scientific calculator permitted
3. Assume suitable data wherever necessary and justify the same.

Part A (5 x 2 = 10 Marks)

1. Differentiate between disjoint and independent events.

2. For a birthday function, Rani has to choose what to wear from the following: 10 Bangles, 3 lipstick, 2 ear rings and 5 different high heel shoes. How many possible outfits does she have to choose from?

3. In a survey, 20 voters were asked their age. The result is summarized in the frequency table below. Construct the Ogive graph.

Age of Voters	20-29	30-39	40-49	50-59	60-69
Frequency	5	5	6	0	4

4. Create stem-leaf display for the given data 23 ,34,42 ,27, 36, 45, 53, 25, 34

5. The fixed-price dinner at Roman Restaurant provides the following choices:
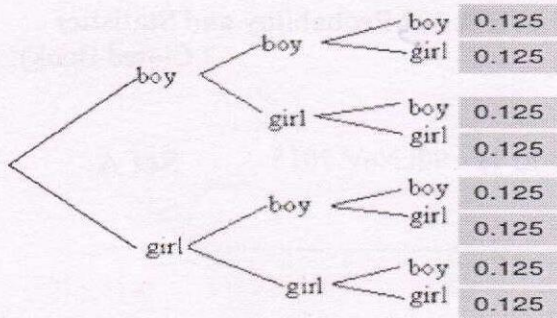
Appetizer: Soup or Salad

Entrée: Chicken, Ribs, or Sausage

Dessert: Apple Pie or Peach Cobbler

List all possible meals that can be served at Roman's.

Part B (3 x 4 = 12 Marks)

6. The tree diagram to find the sample space of family having three children is given below.

(Probability of each possibility is given in the tree)

a Write the event E1 that the family has 3rd child has boy or 3rd child has girl and find P(E1).

b. Write the event E2 that the family has no 3rd boy child and no 3rd girl child and find P(E2).

7. Consider the following table w.r.t Body weight and Hypertension of a human.

	Overweight	Underweight	Normal Weight
Hypertension	0.10	0.02	0.08
Non Hypertension	0.15	0.20	0.45

a. What is the Probability that a randomly selected person has hypertension?

b. A randomly selected person is overweight. What is the probability that the person has hypertension?

8. From a group of 15 smokers and 21 nonsmokers, a researcher wants to randomly select 7 smokers and 6 nonsmokers for a study. In how many ways can the study group be selected ?

Part C (1 x 8 = 8 Marks)

9. A dentist is researching the average time that people brush their teeth. A sample of 21 brushing times is collected and listed below (in seconds).

15	30	35	60	45	135	75	120	15	30	30	45	60	30	120	45
30	335	240	50	90											

a. Order the Observations and find the five number summary: Minimum, Q1, Median, Q3, and Maximum.

b. Draw the Boxplot.

c. Define IQR. Use 1.5 *IQR rule to find the Outliers.