**Ex/1-Stat/IIS/16/2017**

# BACHELOR OF SCIENCE EXAMINATION, 2017

## (1st Year, 1st Semester)

## STATISTICS

## Paper - 2-Stat

Full Marks : 50 Time : Two Hours

*Each questions carries* 10 *marks.*

Answer any *five* questions.

1. Define a Random Experiment and its associated Sample Space. What are events, elementary events, complex events, null event and sure event ?

2. State the Matching problem and find the probability of exactly $k$ matches ($k = 0, 1, 2, ..., n$) when there are $n$ pairs participating in the problem.

3. Let $N$ identical balls be placed in $M$ distinct Boxes at random. What is the probability that Box 2 contains exactly 2 balls ?

4. Suppose you have a coin with Prob (Head)= $\frac{1}{4}$. You toss it repeatedly and independently until you get a Head. What is the probability that the $5^{th}$ toss gives you the first Head ?

[*Turn over*]

5. Among the digits 1, 2, 3, 4 and 5, one digit is chosen at random and then, a second digit is chosen from the remaining 4 digits. Write down the sample space and assume all points there are equally probable. Find the probability that an odd digit is selected (a) for the first time, (b) for the second time.

6. Consider all 24 permutations of the digits 1, 2, 3 and 4 and attach a probability of 1/24 to each. Let $Ai$ be the event that the digit $i$ appears in the $i$-th place of an arrangement $i$ = 1, 2, 3, 4. Prove that (a) $A1 \cap A2 \cap A3 \subset A4$ and (b) $A1 \cap A2 \cap A^c 3 \subset A^c 4$ and (c) Find $P(A3 \cup A1)$.

7. An unbiased coin is tossed independently until two Heads turn up. Find the expectation and the variance of the (minimum) number of tosses needed to obtain these two Heads.

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