Jaypee University of Engineering & Technology,Guna

**Probability Theory and Random Process (18B11MA511)**

**Tutorial-2**

1. If A, and B are independent events, then show that
(i) A and $\overline{B}$ are independent events (ii) $\overline{A}$ and B are independent events
(iii) $\overline{A}$ and $\overline{B}$ are independent events (iv) $P(B) = P(A) \cdot P\left(B/A\right) + P(\overline{A}) \cdot P\left(B/\overline{A}\right)$, $(A \neq 0)$
(v) $P\left(A/B\right) + P\left(\overline{A}/B\right) = 1$ (vi) $P\left(A/A\right) = 1$ (vii) $P\left(A/B\right) = 1$ if $B \subseteq A$.

2.If $P(A) = 3/8, P(B) = 5/8$ and $P(A \cup B) = 3/4$, then find
(i) $P\left(A/B\right)$ (ii) $P\left(\overline{A}/\overline{B}\right)$ (iii) $P\left(B/A\right)$

3. A bolt is manufactured by 3 machines A,B,C. A turns at twice as many items as B and machines B and C produce equal number of items.2 % of bolts produced by A and B are defective and 4% of bolts produced by C are defective. All bolts are put into 1 stock pile and 1 is chosen from the pile. What is the probability that it is defective ?

4. An urn contains 10 white and 3 black balls. Another urn contains 3 white and 5 black balls. Two balls are drawn at random from the first urn and placed in the second urn and then 1 ball is taken at random from the latter. What is the probability that it is a white ball?

5. In a certain city , 40% of the people consider themselves conservative (C), 35% consider themselves to be liberals (L), and 25% consider themselves to be independent (I). During a particular election, 45% of the conservatives voted, 40% of the liberals voted and 60% of the independent voted. Suppose that a person is randomly selected.
(a) Find the probability that the person voted. (b) If the person voted, find the probability that the voter is (i) conservation (ii) liberal (iii) independent.

6. Three machines A,B and C produce, respectively 40%, 10% and 50% of the items in a factory. The percentage of defective items produced by the machines is, respectively 2%, 3% and 4%. An item from the factory is selected at random.
(a) Find the probability that item is defective.
(b) If the item is defective, find the probability that the item was produced by :
(i) machine A (ii) machine B (iii) machine C.