



Practice Set – I&II

Sub: Statistical Methods & Data Analysis (MA 231)

1. In an organization, out of 200 employees, 40 are having their monthly salary more than Rs. 15,000 and 120 of them are regular takers of Alpha Brand Tea. Out of those 40, who are having their monthly salary more than Rs. 15,000, 20 are regular takers of Alpha Brand Tea. If a particular employee is selected, what is the probability that he is having monthly salary more than Rs. 15,000, if he is a regular taker of Alpha Brand Tea.
2. A survey of magazine subscribers showed that 45.8% rented a car during the past 12 months for business reasons, 54% rented a car during the past 12 months for personal reasons, and 30% rented a car during the past 12 months for both business and personal reasons. What is the probability that a subscriber rented a car during the past 12 months for business or personal reasons? What is the probability that a subscriber did not rent a car during the past 12 months for either business or personal reasons?
3. IOCL selects students through campus interview independently from MBA, M.Tech and B.Tech of RGIPT. Let the chances of selecting an MBA, M.Tech and B.Tech student are 50%, 25% and 75%, respectively. What is the probability that a student will be placed in IOCL?
4. A pharmaceutical company conducted a study to evaluate the effect of an allergy relief medicine; 250 patients with symptoms that included itchy eyes and a skin rash received the new drug. The result of the study are as follows: 90 of the patients treated experienced eye relief, 135 had their skin rash clear up, and 45 experienced relief of both itchy eyes and skin rash. What is the probability that a patient who takes the drug will experienced relief of at least one of the two symptoms?
5. From a city population, the probability of selecting i) a male or a smoker is $\frac{7}{10}$, ii) a male smoker is $\frac{2}{5}$, and iii) a male, if a smoker is already selected is $\frac{2}{3}$. Find the probability of selecting i) a non-smoker, ii) a male, and iii) a smoker, if a male is first selected.
6. The south east regional manager of General Express, a private parcel-delivery firm, is worried about the likelihood of strikes by some of its employees. He has learned that the probability of a strike by his pilots is 0.75 and the probability of a strike by his driver is 0.65. Further, he knows that if the drivers strike, there is a 90 percent chance that the pilots will strike in sympathy.
 - i) What is the probability of both groups' striking?
 - ii) If the pilots strike, what is the probability that the drivers will strike in sympathy?
7. If A and B are two independent events then show that \bar{A} and \bar{B} are also so.
8. There are two identical urns containing respectively 4 white and 3 red balls and, 3 white and 7 red balls. An urn is chosen at random, and a ball is drawn from it. Find the probability that the ball is white. If the ball drawn is white, what is the probability that it is from the first urn?
9. A factory produces a certain type of outputs by three types of machine. The respective daily production figures are:
Machine I: 3,000 units; Machine II: 2,500 units; Machine III: 4,500 units
Past experience shows that 1 percent of the output produced by Machine I is defective. The corresponding fraction of defectives for the other two machines are 1.2 percent and 2 percent respectively. An item is drawn

at random from the day's production run and is found to be defective. What is the probability that it comes from the outputs of i) Machine I ii) Machine II iii) Machine III.

10. Reliance purchased an option on land in Krishna Godavari basin. Preliminary geologic studies assigned the following prior probabilities.

$$\begin{aligned} P(\text{high-quality oil}) &= 0.50 \\ P(\text{medium-quality oil}) &= 0.20 \\ P(\text{no oil}) &= 0.30 \end{aligned}$$

- i) What is the probability of finding oil?
 ii) After 200 feet of drilling on the first well, a soil test is made. The probabilities of finding the particular type of soil identified by the test are

$$\begin{aligned} P(\text{soil} | \text{high-quality oil}) &= 0.20 \\ P(\text{soil} | \text{medium-quality oil}) &= 0.80 \\ P(\text{soil} | \text{no oil}) &= 0.20 \end{aligned}$$

What are the revised probabilities, and what is the new probability of finding oil? How should the firm interpret the soil test?

11. A box contains 3 black and 7 white balls. A ball is picked up at random, two more balls of the same color are added to the box. A ball is drawn again and two more balls of the same color are added to the box. Now a ball is chosen from the box and found to be black. What is the probability that the first ball drawn is white?

12. The monthly demand for transistors is known to have the following probability distribution:

Demand :	1	2	3	4	5	6	
Probability :	0.10		0.15	0.20	0.25	0.18	0.12

Determine the expected demand for transistors. Also obtain the variance.

13. Bob Walters, who frequently invests in the stock market, carefully studies any potential investment. He is currently examining the possibility of investing in the Trinity Power Company. Through studying past information, Walters has broken the potential results of the investment into five possible outcomes with accompanying probabilities. The outcomes are annual rates of return on a single share of stock that currently costs \$ 150. Find the expected value of the return for investing in a single share of Trinity Power.

Return on investment (\$)	0	10	15	25	50
Probability	0.20	0.25	0.30	0.15	0.10

If Walters purchases stock whenever the expected rate of return exceeds 10 percent, will he purchase the stock, according to this data?

14. A man with n keys wants to open his door and tries the keys independently & at random. Find the average number of trials required to open the door, if unsuccessful keys are not eliminated from further selection.

15. Let X be a continuous random variable with pdf given by $f(x) = ke^{-|x|}$, $-\infty < x < \infty$. Calculate the MGF of X . Hence obtain its mean and variance.

16. The Rs. 100 fully paid up share of Reliance Mutual Fund is currently selling at Rs. 720. Possible dividend payments and the corresponding market prices at the end of the year are shown below:

Dividend per share (Rs.)	Prob.	Market price ex-dividend at the end of year (Rs.)
10	0.1	760
20	0.5	840
30	0.3	900
40	0.1	1000

Compute the expected value of the returns (dividend appreciation in share value).

Instructor: Dr. C. Kundu

Department of Mathematical Sciences, RGIPT Jais