Q.No.1:- Errors in an experimental transmission channel are found when the transmission is checked by a certifier that detects missing pulses. The number of errors found in an eight-bit byte is a random variable with the following distribution:

$$F(x) = \begin{cases} 0, & x < 1 \\ 0.8, & 1 \le x < 4 \\ 0.9, & 4 \le x < 7 \\ 1.0, & 7 \le x \end{cases}$$

Determine each of the following probabilities.
(a) $P(X \le 4) =$
(b) $P(X > 7) =$
(c) $P(X \le 5) =$
(d) Find $f(x)$; the prbability mass function.

Q.No.2:- Assume that flaws per sheet of glass can be represented by a Poisson distribution, with an average of 0.7 flaws per sheet.
(a) What is the probability that randomly selected two sheets of glass have more than one flaw?
(b) What is the mean number of flaws per 12 sheets?

Q.No.3:- Thirty percent of all households have a DVD player.
(a) If you select 20 houses at random, what is the probability that at least four of them have a DVD player?
(b) If the household were checked one by one, what is the probability that the first household, that has a DVD player, is the fifth?
(c) Given that in a randomly selected block there are 15 houses, what is the probability that 6 houses would have a DVD player, in a sample of 8 houses randomly selected from that block?

Q.No.4:- If there are 200 typographical errors randomly distributed in a 500-page manuscript, Find the probability that a given page contains exactly 3 errors.

Q.No.5:- An insurance company offers its policyholders a number of different premium payment options. For a randomly selected policyholder, let X be the number of months between successive payments. The cumulative distribution function of X is:

$$F(x) = \begin{cases} 0, & x < 1 \\ 0.4, & 1 \le x < 2 \\ 0.6, & 2 \le x < 3 \\ 0.8, & 3 \le x < 4 \\ 1, & 4 \le x \end{cases}$$

(a) What is the probability mass function of X?
(b) Compute the mean number of months between successive payments.
(c) Compute $P(1.5 < X < 4)$.

Q.No.6:- A player of a video game is confronted with a series of opponents and has an 80% probability of defeating each one. Success with any opponent is independent of previous encounters. The player continues to contest opponents until defeated.
(a) What is the probability mass function of the number of opponents contested in a game?
(b) What is the probability that a player defeats at least two opponents in a game?
(c) What is the expected number of opponents contested in a game?

Q.No.7:- If electricity power failures occur according to a Poisson distribution with an average of 3 failures every twenty weeks, calculate the probability that
(a) there will not be more than one failure during a particular week.
(b) we have to wait more than 5 weeks to see the next power failure?

Q.No.8:- Write the complete probability mass function (after putting values of all the parameters, involved) for variable X in the following examples:
(a) A college administrator randomly selects students until he finds a student that have volunteered to work for a local organization. The probability that student volunteers to work for a local organization is 0.15. Let X equal the number of students selected.
(b) A Quality Control Inspector (QCI) has to investigate a lot containing 25 pieces of metallic sheet out of which 22 have acceptable color. The QCI randomly selects 5 pieces of metallic sheet from the lot, without replacement. Let X equal the number of metallic sheets with acceptable color.

Q.No.9:- The number of arrivals at a local gas station between 3:00 and 5:00 P.M. has a Poisson distribution with a mean of 12.
(a) Find the probability that the number of arrivals between 3:00 and 5:00 P.M. is at least 1.
(b) Find the probability that the number of arrivals between 3:30 and 4:00 P.M. is at most 1.
(c) Find variance for the number of arrivals between 4:00 and 5:00 P.M.

Q.No.10:- The probability that a patient recovers from a delicate heart operation is 0.8. For the next three patients who have this operation:
(a) What is the probability that exactly 2 patients survive?
(b) What is the average number of survived patients?