Assignment – Module 2

1. (a) Obtain the area under the standard normal curve for following cases
   i. Between z = -0.7 and z = 0
   ii. $z \leq 0.8$
   iii. Between z = -1.2 and z = 2.4

   (b) Obtain 'z' from standard normal curve, such that $P[Z \leq z] = 0.75$
2. The monthly flow of a stream is assumed to follow normal distribution with mean of 280 m^3/sec and standard deviation of 75 m^3/sec.
   i. Obtain the probability of the flow being greater than 200 m^3/sec and less than 350 m^3/sec.
   ii. Obtain the probability of flow being less than 50 m^3/sec.
   iii. Obtain the probability of flow being greater than 500 m^3/sec.
3. A random variable X is assumed to follow normal distribution with following probabilities.

   $P[X \leq 10] = 0.1$ and $P[X \leq 30] = 0.85$

   Obtain the mean and standard deviation of the random variable.
4. The annual rainfall 'X' is assumed to follow normal distribution over a basin with mean 100 mm and standard deviation 70 mm. Annual runoff 'Y' (in mm) from the basin is related to annual rainfall by $Y = 1.5X - 30$ (for $X > 20$mm)
   i. Determine the mean and standard deviation of annual runoff.
   ii. Obtain the probability that the annual runoff will exceed 80 mm.

5. The mean and standard deviation of annual rainfall of a basin is 1100 mm and 400 mm respectively. The annual rainfall is assumed to follow log-normal distribution. Obtain the probability that the annual rainfall exceeds 1500 mm.
6. In a river basin, the mean time between two flood events of a given magnitude is 10 years. Assuming that the mean time follows an exponential distribution; obtain the probability of the flood recurring within next 5 years if it has occurred in the present year.
7. The mean and standard deviation of the monthly stream flow in a river basin are 300 m^3/sec and 98 m^3/sec respectively. Assuming that the monthly stream flow is approximated by Gamma distribution, obtain the probability of average stream flow being more than 500 m^3/sec.
8. The hourly rainfall of a watershed exceeds 240 mm with a probability of 0.02 and exceeds 270 mm with a probability of 0.01. Assuming that the hourly rainfall follows Gumbel's (EV-I) distribution, obtain the probability that it exceeds 100 mm. Obtain the same probability if it follows Log-normal distribution.
9. Obtain $P[X \leq 100]$ using Weibull's distribution for a sample 'X' with mean of 250 units and standard deviation of 190 units.