Programme: MSc. (Statistics)   **Part-2**   **Semester-2**

Practical- 2.4.4   **Poisson Processes**   **Date-**

Q.1.Suppose that customers arrive at a bank according to the Poisson process with the mean rate of 3 per minute. Find the probability that in an interval of 2 minutes, the number of customers arriving is exactly four.

Q.2.Customers arrive at a bank according to the Poisson process with rate 10/hr. Given that 2 customers arrive in first 5 minutes what is the probability that
(i) Both arrive in first 2 minutes
(ii) at least one arrives in first two minutes

Q.3.A radioactive source emits a particle at a rate of 5/min in accordance with the Poisson process. Each particle emitted has a probability of 0.6 of being recorded . Find the probability that the number of particles recorded in the 4 minutes interval is 10.

Q.4.Suppose a customer arrives at a counter in accordance with the Poisson process with mean rate 2 per minute. Find the probability that the interval between two successive arrivals is more than 1 minute.

Q.5.Babies are born in a thinly populated state at the rate of one birth every 12 minutes. The time between birth follows exponential distribution. Find
(i) The average number of births per year.
(ii) The probability that a day will go without a newborn.
(iii) The probability that the time between two successive births is at least 8 minutes.

Q.6.Let $\{N(t), t \in [0,\infty)\}$ be a Poisson process with rate $\lambda=0.5$.
(a) Find the probability of no arrivals in (3,5].
(b) Find the probability that there is exactly one arrival in each of the following intervals:(0,1], (1,2], (2,3] and (3,4].

Q.7.Let $N_1(t)$ and $N_2(t)$ be two independent Poisson processes with rates $\lambda_1=1$ and $\lambda_2=2$, respectively. Let $N(t)$ be the merged process $N(t)=N_1(t)+N_2(t)$.
(a) Find the probability that $N(1)=2$ and $N(2)=5$.
(b) Given that $N(1)=2$, find the probability that $N_1(1)=1$.