Queueing Theory 'OR' Waiting Line Theory

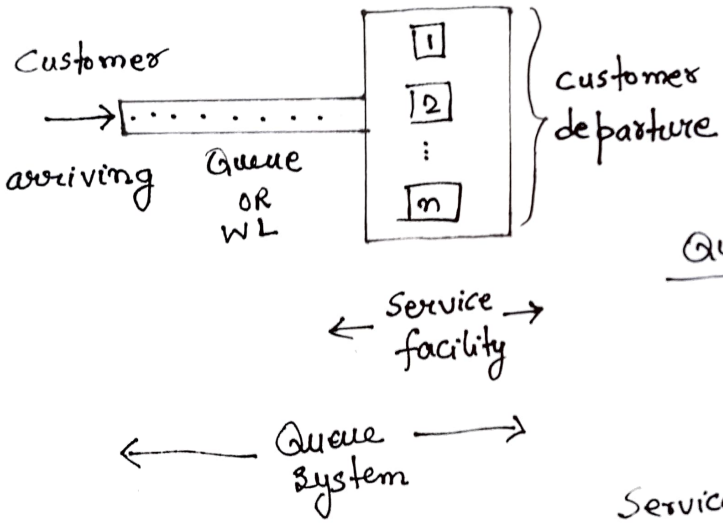
Introduction : A flow of customer from infinite / finite population towards the service facility forms a queue (waiting Line).

Why Queue Form :

(i) When no. of customers exceed no. of server.

(ii) Server do not work effieiently and take more time than prescribed to serve a customer.

Queue Model :



Customer : The arriving unit that requires some services to be performed is called customer. The customer may be person, machines, vehicles etc.

Queue : stands for the number of customers waiting to be serviced. This does not include the customer being serviced.

Service facility : The process or system that provides services to the customers is termed as service channel or service facility.

Queue System :

A queue system can be completly described by :

(1) The Input (Arrival pattern)
(2) The service mechanism (service pattern)
(3) The Queue discipline
(4) Customer's behaviour.

(i) **The Input (Arrival pattern)** : Input describe the way in which the customers arrive and join the system. Generally, customer arrive in a more or less random fashion, which is not possible to predict. Thus, the arrival pattern can be described in terms of probabilities, and consequently, the probability distribution for inter-arrival times (the time between two successive arrivals) must be defined. We deal with those queueing system in which the customers arrive in poisson fashion.

(ii) Service Mechanism : This means, the arrangement of service facility to serve customers.

If there is an infinite no. of servers, then all the customers are served instantaneously on arrival, and there will be no queue.

If no. of servers is finite then the customers are served according to spefic order, with service time as a constant or random variable.

(iii) Queue discipline : It is a rule according to which the customers are selected for service when a queue has been formed. The most common discipline are :

a) First come First serve (FCFS) or FIFO
(b) LCFS or LIFO
(c) SIRO (service in random order)
(d) Priority.

(iv) Customer's Behaviour : The customers generally behave in the following ways.

(a) Patience

(b) Impatience

(i) Balking

(ii) Reneging

(iii) Jockeying

Mean Arrival Rate (λ): No. of customer arriving per unit of time.

Mean service rate (μ): No. of customers served per unit of time.