ANALYSIS OF A MULTIPLE SERVICE CHANNEL QUEUEING MODEL WITH PRIORITY QUEUE DISCIPLINE AND PHASE SERVICE - PART I

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Abstract

Multiple service channel queuening models are much useful in analyzing the practical situations arising at those places where phase service is provided under priority queue discipline. Sometimes it has been found that the input customers demanding for their service at various queueing situations can be categorized in view of factors of age, sex, nationality and VIPs etc. in order to serve them more rationally. Thus multiple service channel queueing models become more significant when the source of input customers is to be classified into two or more categories

to serve them in various phases on priority base so that their waiting times may be reduced and the respective input customers of higher or lower priority may be served more efficiently by a server having greater service rate in an appropriate order. Generally priority queue discipline is applied in emergency services or due to other reason mentioned above. A number of noteworthy & devoted researchers can be found in the literature who have given their significant contribution in order to study priority queues subject to different parameters. In the beginning of the seventh decade of twentieth century, Miller [3] has confined his study on priority queues. Later Jaiswal [2] and Takacs [4] have also studied priority queues and succeeded in presenting various useful results. Their after, a considerable work of Hawkes [1] is also mentionable who has extended the excellent work of Jaiswal [2] and studied on the time dependent solution of a priority queue with bulk arrivals. Furthermore, a rigorous study has been done by Welch [5] for queues on taking into account of preemptive resume. Thus it has been seen in the literature that a considerable attention has been focused by several previous researchers in the past decades on account of different

parameters for various queueing systems with priority que discipline. In the current study, we consider a multiple service channel queuening model where service is rendered in two phases for input customers on preemptive priority basis. The study of multiple service channel queues with priority queue discipline and phase service either in transient or steady state conditions has a much wider scope in emerging areas of science and technologies like in machine maintenance, road traffic, defense operations and inventory management etc. The present paper deals with problems of determining both the transient as well as steady state equations of a particular queueing model with multiple service channels with phase service on preemptive priority service rule. Moreover, an attempt has also been made to focus the significant of our investigated transient and steady state equations of the multiple service channel queuing system in our conclusions at the end of present paper. We remark here that one can use our investigated results for the optimality aspects of the queueing model taken into consideration by developing the expected total cost per unit time.