CHAPTER – 7
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7.0 RESULTS AND ANALYSIS:

Maintenance is an important function in any production or service environment. With optimal maintenance of equipments clubbed with optimal resource management, it is possible to economize production and achieve total productivity. Evaluation of the best maintenance policy for a process or for a system of components in uncertainty situations is a challenging task. In this piece of research, stochastic situation is taken into account for the parameters of the problem, and an attempt is made to find the best replacement strategies for a block of similar items in a system. Many researchers developed replacement models considering money value as the bank interest rate. But in reality, real worth of money or real interest rates are to be considered to compute present worth of future money or future value of investments made at various points of time. Hence, inflation is accounted from which real interest rates are computed. It is quite natural that prices of items/industrial units fluctuate with respect to prices in a base year/period. If real increase in value of money is not considered and instead nominal increase in value of money (bank interest rate) is employed in replacement model, reality or practicality is neglected and the solution obtained will not be reliable. Hence, the intention of predicting inflation in best forecasting methods (a method with minimum forecast errors) paved the way for the development of this “Block Replacement Model”. When forecast errors are compared for sufficient forecasting techniques, for the given input, a regression model shown in chapter-6 (page No-86) proved to be the best and hence used for predicting future inflation. Table 6.4 reveals the forecast errors for Regression Model with Trigonometric functions employed to forecast inflation. Mean Square Error (MSE), Mean Absolute Deviation(MAD), Mean absolute percentage error(MAPE), BIAS
etc., are the variables used to compare efficiency of Forecasting technique and through tables 6.4, 6.5 it is read that above errors are minimum for the regression model employed. The output of this model forms a class of input for the replacement problem defined along with other inputs like initial cost, repair cost, number of items etc., in a system.

First order Markov Chains help in arriving transition probabilities based on the probabilities of previous period. Stochastic situation need not be confined to simply first order linkages. Hence, higher order Markov Chain (Process) has been suggested in this model where greater amount of uncertainty is taken care of by calculating transition probabilities based on all past periods data instead of simply one previous period's data. The solution obtained through this hypothesis and with these techniques is bound to be reliable and practicable comparatively first order Markov chain. Spectral Decomposition method is employed to compute higher order transition probabilities and made use of in calculating frequencies of various types of failures in each period. Replacement strategies are evaluated and best strategy to replace an entire block of items is arrived and indicated in the fifth row of last table.

7.1 LIMITATIONS AND SCOPE OF FUTURE WORK:

In this work, only two intermediate states (minor and major repair) for items between operable and irreparable states are considered. That is, only four general states of items are allowed. Practically, there may be varieties of failures and for each different repair cost can be attached. It is difficult to treat a particular failure as minor repair or as a major repair. Therefore, few more states are to be proposed so that a type of failure will be very close to a particular state and a model is proposed.