**Graph theory and Matrix Approach (GTMA) Model for the Selection of the Femoral-Component of Total Knee Joint Replacement**

**Abstract:**

Total Knee Replacement (TKR) is the increasing trend now a day, in revision surgery which is associated with aseptic loosening, which is a challenging research for the TKR component. By the selection of optimal material loosening can be controlled at some limits. This paper is going to consider for the best material selected among a number of alternative materials for the femoral component (FC) by using Graph Theory. Here GTMA process used for optimization of material and a systematic technique introduced through sensitivity analysis to find out the more reliable result. Obtained ranking suggest the use of optimized material over the other existing material. By following GTMA **Co\_Cr-alloys (wrought-Co-Ni-Cr-Mo) and Co\_Cr-alloys (cast-able-Co-Cr-Mo)**are on the 1st and 2nd position respectively.

***Keywords :***Femoral component, Knee replacement, Graph Theory and Matrix approach, Sensitivity analysis,