The human knee joint is a weight bearing joint which is classified as synovial, diarthrosis complex joint. The knee is essentially made up of femur, tibia, fibula and patella. When the knee moves, it does not just bend and straighten, there is also a slight rotational component in this motion. The knee muscles which go across the knee joint are the quadriceps and the hamstrings. The quadriceps muscles are on the front of the knee, and the hamstrings are on the back of the knee. The ligaments are equally important in the knee joint because they hold the joint together. In review, the bones support the knee and provide the rigid structure of the joint, the muscles move the joint, and the ligaments stabilize the joint.

Arthritis is a degenerative joint disease and is the leading cause of disability in people over the age of 55. Osteoarthritis is the most common type of arthritis which occurs following trauma to the joint, following an infection of the joint or simply as a result of aging. The major complaint by individuals who have arthritis is joint pain. [Wollenhaupt.j. et al., 1988]. There is no cure for either rheumatoid or osteoarthritis. Medications can help reduce inflammation in the joint which decreases pain. Moreover, by decreasing inflammation, the joint damage may be slowed [Ettinger Jr et al., 1997]. Joint replacement surgery may be required in eroding forms of arthritis. Knee replacement or knee arthroplasty, is a surgical procedure to replace the weight-bearing surfaces of the knee joint to relieve pain and disability. It is most commonly performed for osteoarthritis [Simon H Palmer 2012]. Knee replacement surgery can be performed as a partial or a total knee replacement. In general, the surgery consists of replacing the diseased or damaged joint surfaces of the knee with metal and plastic components shaped to allow continued motion of the knee. The artificial components used are called prostheses. The two
important prostheses are femoral and tibia components. For the durability of the prosthetic knee joint, the lower contact stress of femoral/tibia joint has to be confirmed for the relevant materials. Also, the heat flux and temperature gradient at the contact region has to be studied for the better performance.

Finite element analysis has been used as a numerical solution technique to solve various engineering problems. Recently this technique has been used in biomedical engineering, for the analysis of prosthetic bone joints. The stresses at the contact region, the heat flux and temperature gradient at the contact region and the different biometerials for the prostheses are of interest in predicting potential for damage of prosthetic knee components. This fact has generated a great deal of interest among the biomaterials research group in determining the magnitude of stresses within the tibial insert, to study the heat distribution and to investigate biometerials. In this regard, number of computational work has been done to study the natural and prosthetic knee mechanics. Earlier study includes the prediction of the stresses within the femur as a function of load [Wismans et al., 1980]. It is reported, studies on stress distribution using two dimensional dynamic model of the knee [Moeinzadeh et al. 1983]. Stresses can be predicted using both two dimensional and three dimensional knee models [Abdel-Rahman. E. et al., 1998]. Explicit dynamic model was developed to predict the contact mechanics during dynamic loading [Godest et al., 2002]. Friction generates surface heat during articulation of total knee systems which results in damage to and failure [Young et al., 1999]. However, meagre information is available in the literature pertaining to the contact analysis of prosthetic femoral/tibia joint for different materials combinations and thermal analysis. In the light of the above, the present work is aimed at determining the contact stresses and to perform thermal analysis of femoral/tibia joint for different materials combination.