

# Knee Joint

## Note:

These is a preliminary consideration of the chapter for better & actual understanding of the topic kindly refer to the textbook for any missconcept teacher is not responsible.

# KNEE JOINT

## Features

The knee is the largest and most complex joint of the body.

## Type

- It is condylar synovial joint, incorporating two condylar joints between the condyles of the femur and tibia, and one saddle joint between the femur and the patella.
- It is also a complex joint as the cavity is divided by the menisci.

## **Articular Surfaces**

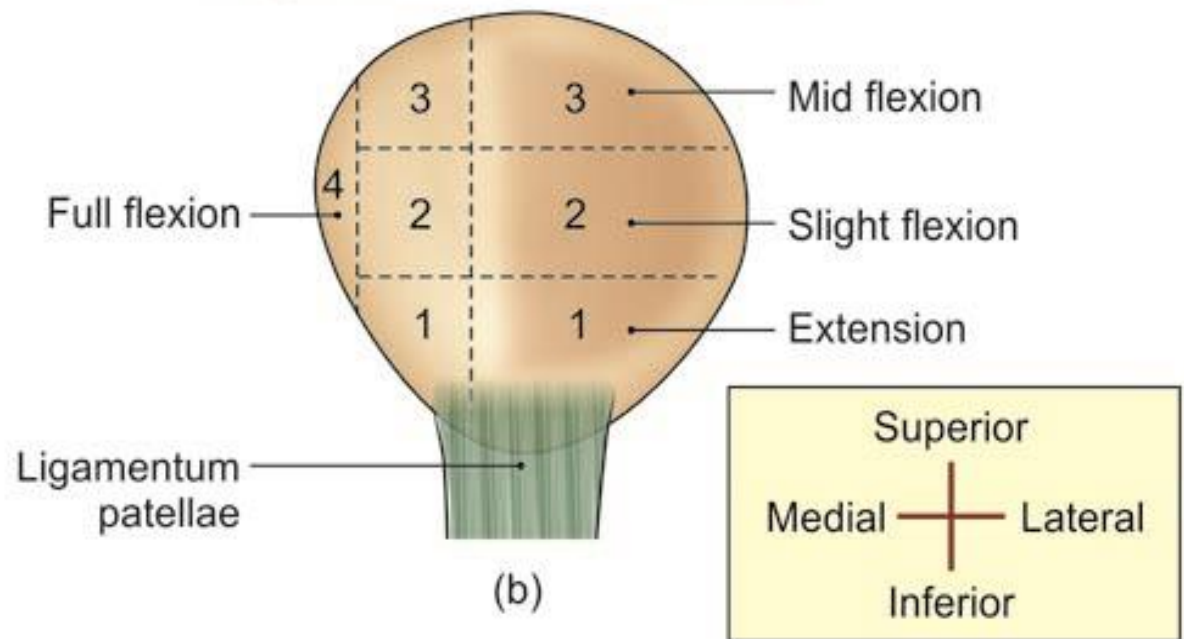
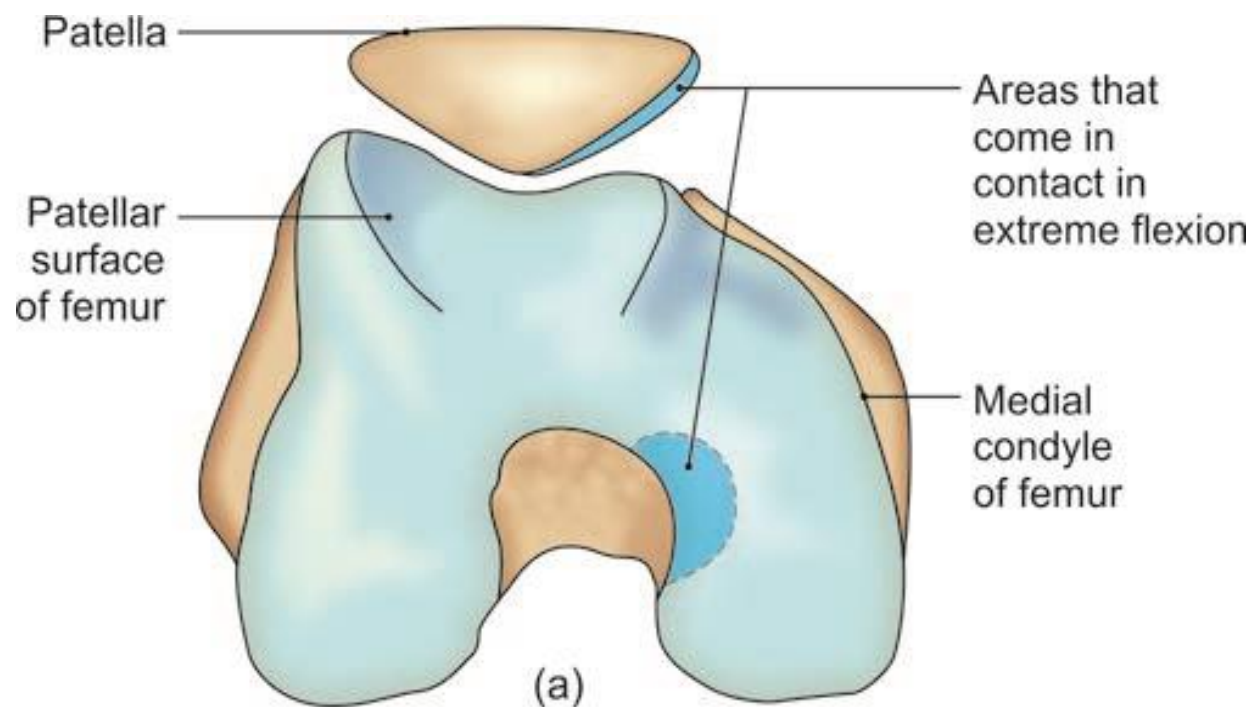
The knee joint is formed by:

1. The condyles of the femur.
2. The patella.
3. The condyles of the tibia.

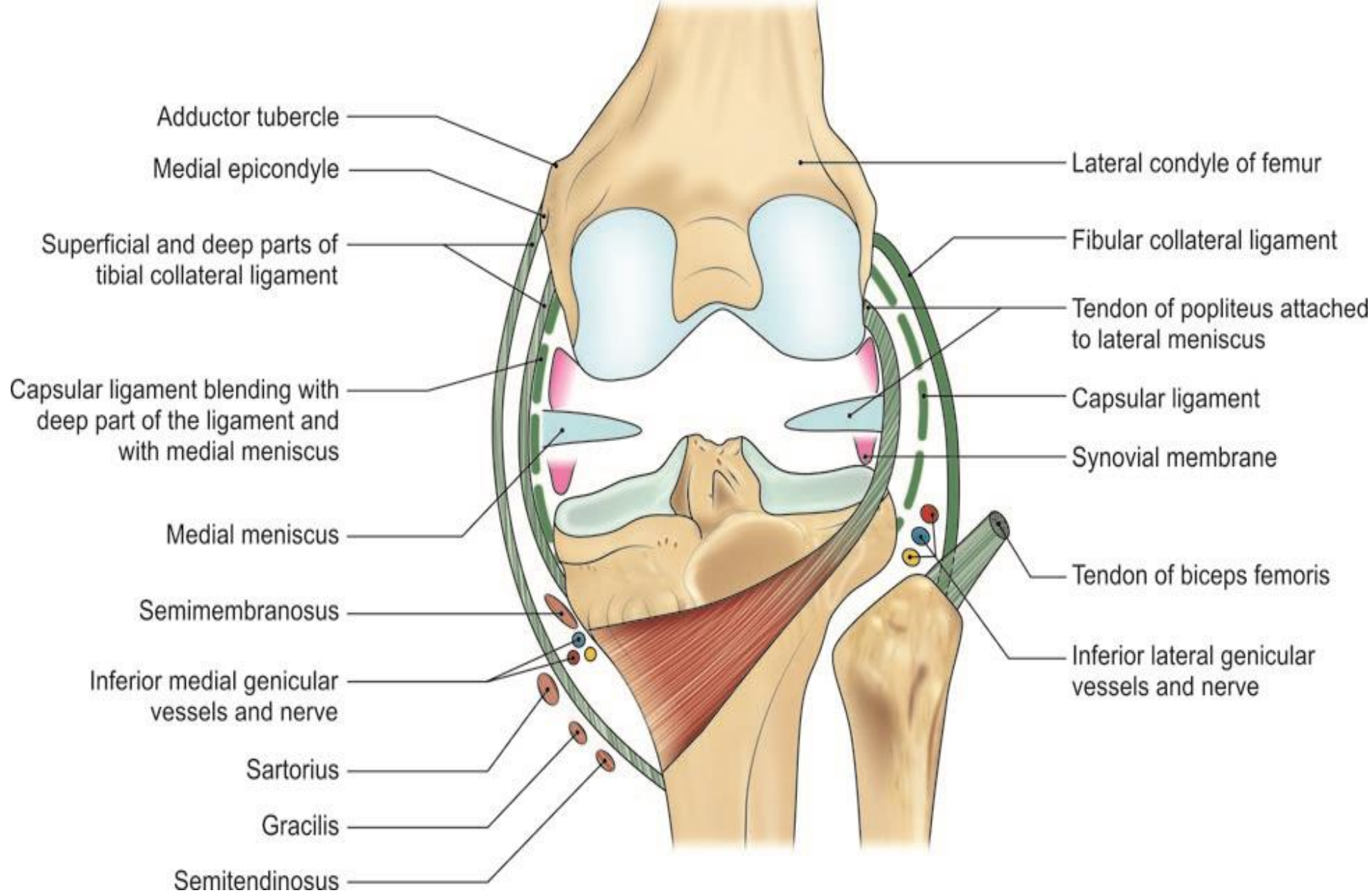
## **Ligaments**

1. Fibrous capsule.
2. Ligamentum patellae.
3. Tibial collateral or medial ligament.
4. Fibular collateral or lateral ligament.
5. Oblique popliteal ligament.

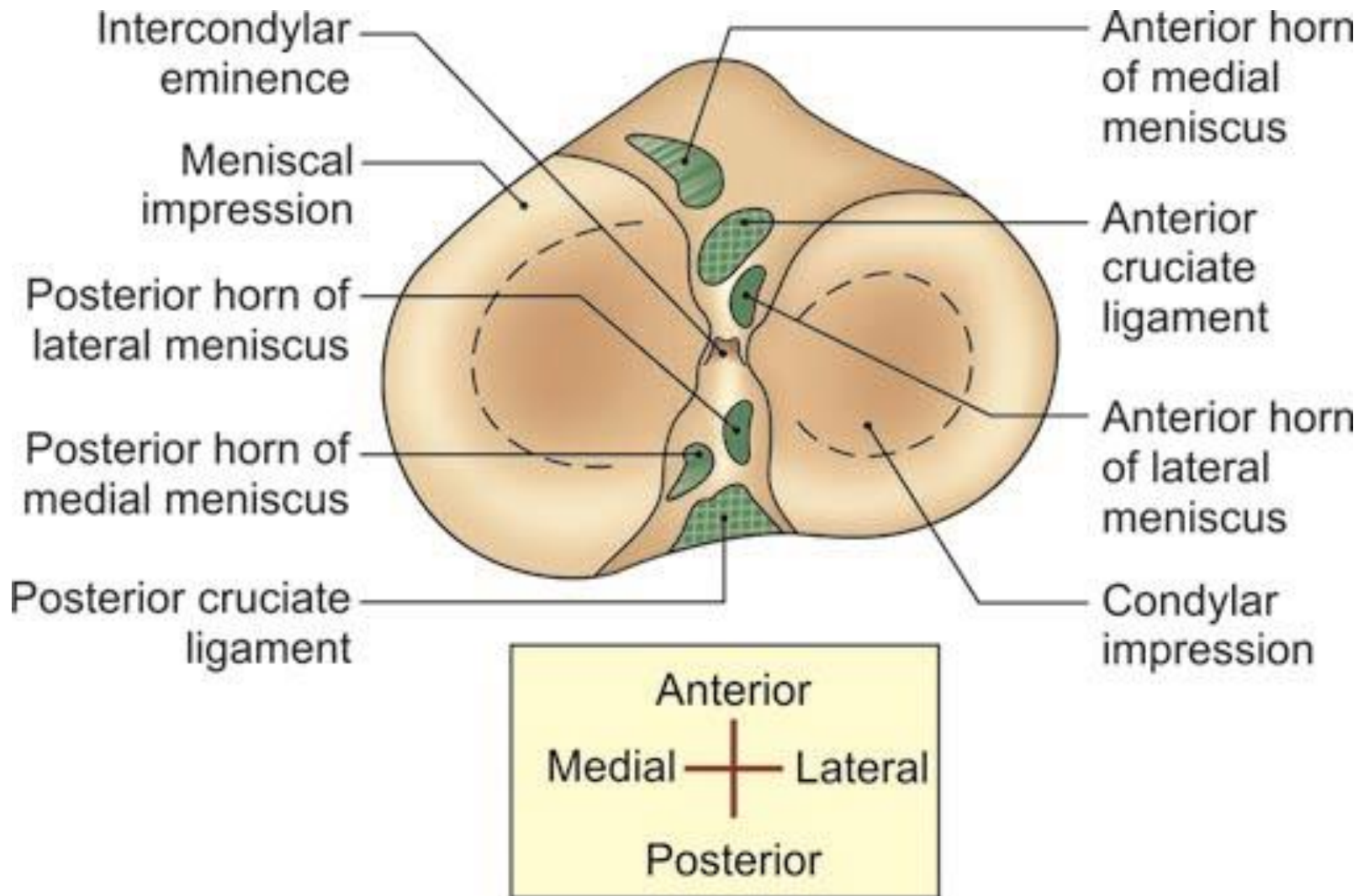
6. Arcuate popliteal ligament.
7. Anterior cruciate ligament.
8. Posterior cruciate ligament.
9. Medial meniscus.
10. Lateral meniscus.
11. Transverse ligament.



(a) Lower end of the femur and patella, and (b) posterior view of patella

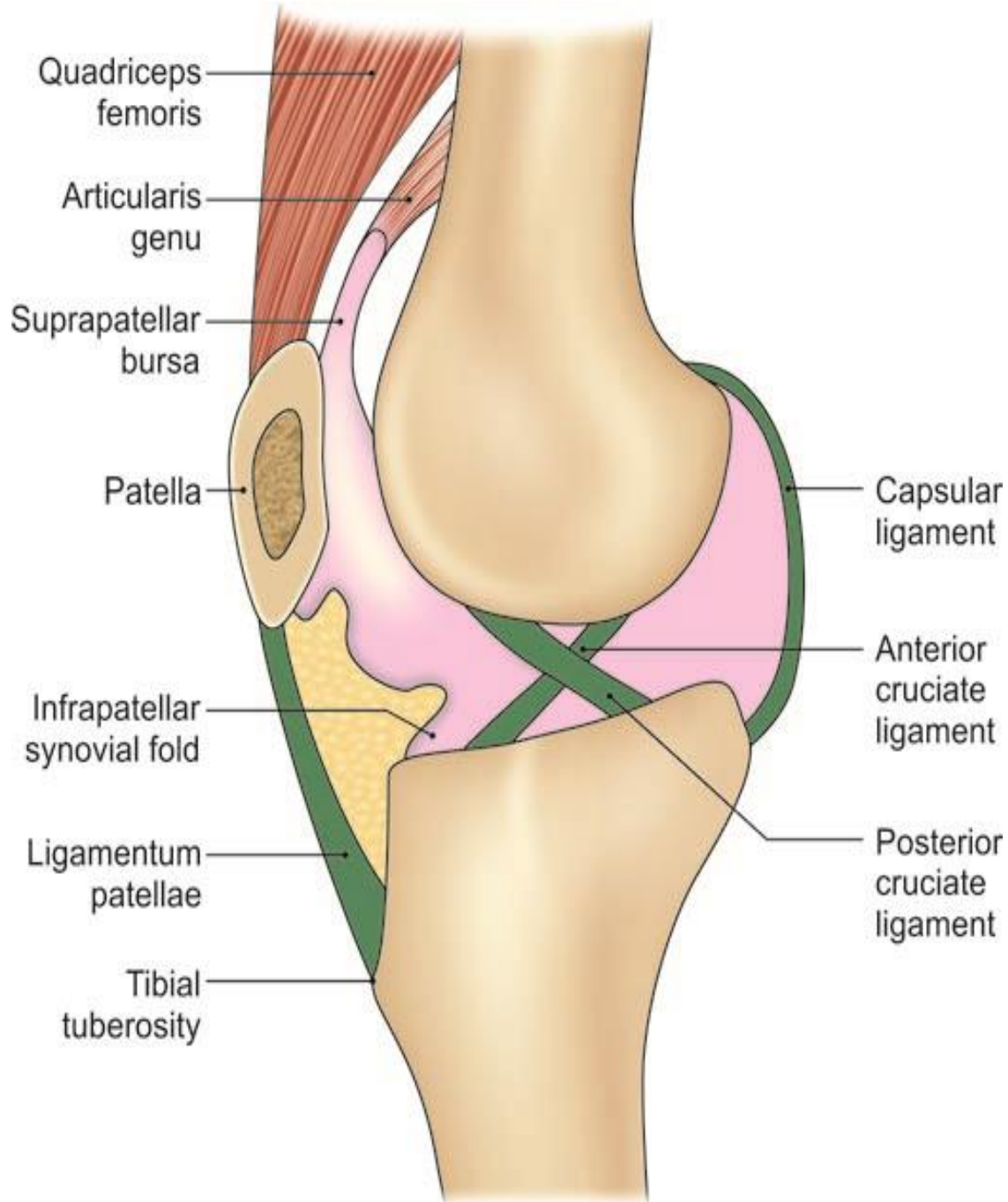


Tibial and fibular collateral ligaments



Superior view of upper end of the right tibia

Sagittal section through the knee joint of right side seen from the medial aspect to show the reflection of the synovial membrane (note the cruciate



# SYNOVIAL MEMBRANE

## Features

The synovial membrane of the knee joint lines the capsule, except posteriorly where it is reflected forwards by the cruciate ligaments, forming a common covering for both the ligaments.

## Bursae around the Knee

As many as 12 bursae have been described around the knee—four anterior, four lateral, and four medial. These bursae are as follows.

### *Anterior*

1. Subcutaneous prepatellar bursa.
2. Subcutaneous infrapatellar bursa.

3. Deep infrapatellar bursa.
4. Suprapatellar bursa.

### *Lateral*

1. A bursa deep to the lateral head of the gastrocnemius.
2. A bursa between the fibular collateral ligament and the biceps femoris.
3. A bursa between the fibular collateral ligament and the tendon of the popliteus.
4. A bursa between the tendon of the popliteus and the lateral condyle of the tibia.

## ***Medial***

1. A bursa deep to the medial head of the gastrocnemius.
2. *The anserine bursa is a complicated bursa which separates the tendons of the sartorius, the gracilis and the semitendinosus from one another, from the tibia, and from the tibial collateral ligament.*
3. A bursa deep to the tibial collateral ligament.
4. A bursa deep to the semimembranosus.

## **Relations of Knee Joint**

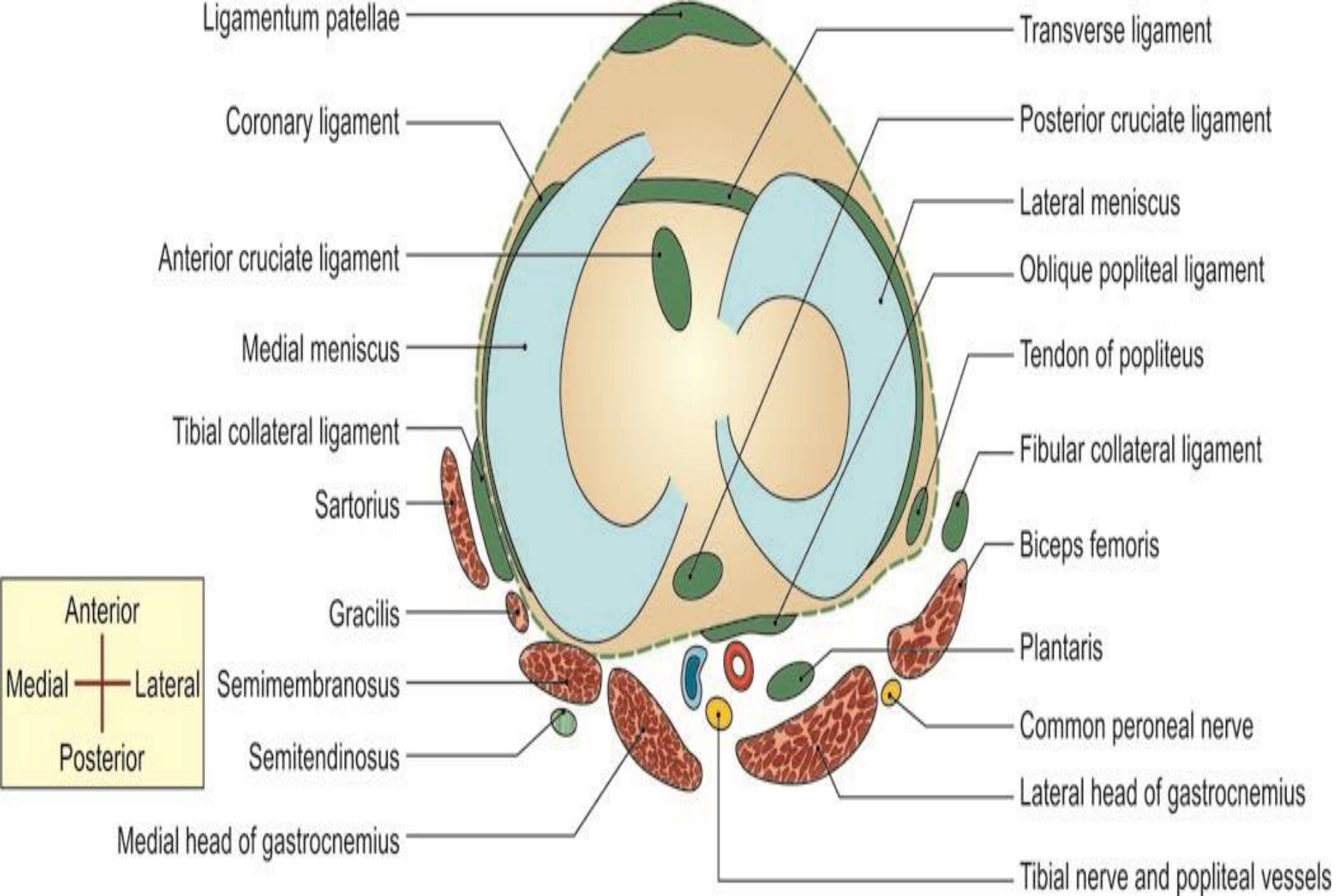
- *Anteriorly,*
- *Posteriorly,*
- *Medially,*

## **Blood Supply**

1. Five genicular branches of the popliteal artery.
2. The descending genicular branch of the femoral artery.
3. The descending branch of the lateral circumflex femoral artery.
4. Two recurrent branches of the anterior tibial artery.
5. The circumflex fibular branch of the posterior tibial

## **Nerve Supply**

1. Femoral nerve,
2. Branches of sciatic nerve, i.e. tibial and common peroneal



Transverse section through the right knee joint showing the relations

# MOVEMENTS AT THE KNEE JOINT

## Features

Active movements at the knee are flexion, extension, medial rotation and lateral rotation (Table 12.2).

*Flexion* and *extension* are the chief movements. These take place in the upper compartment of the joint, above the menisci.

Rotatory movements at the knee are of a small range and occur in lower compartment below the menisci.

## Locking and Unlocking of the Knee Joint

Locking is a mechanism that allows the knee to remain in the position of full extension as in standing without much muscular effort.

Locking occurs as a result of medial rotation of the

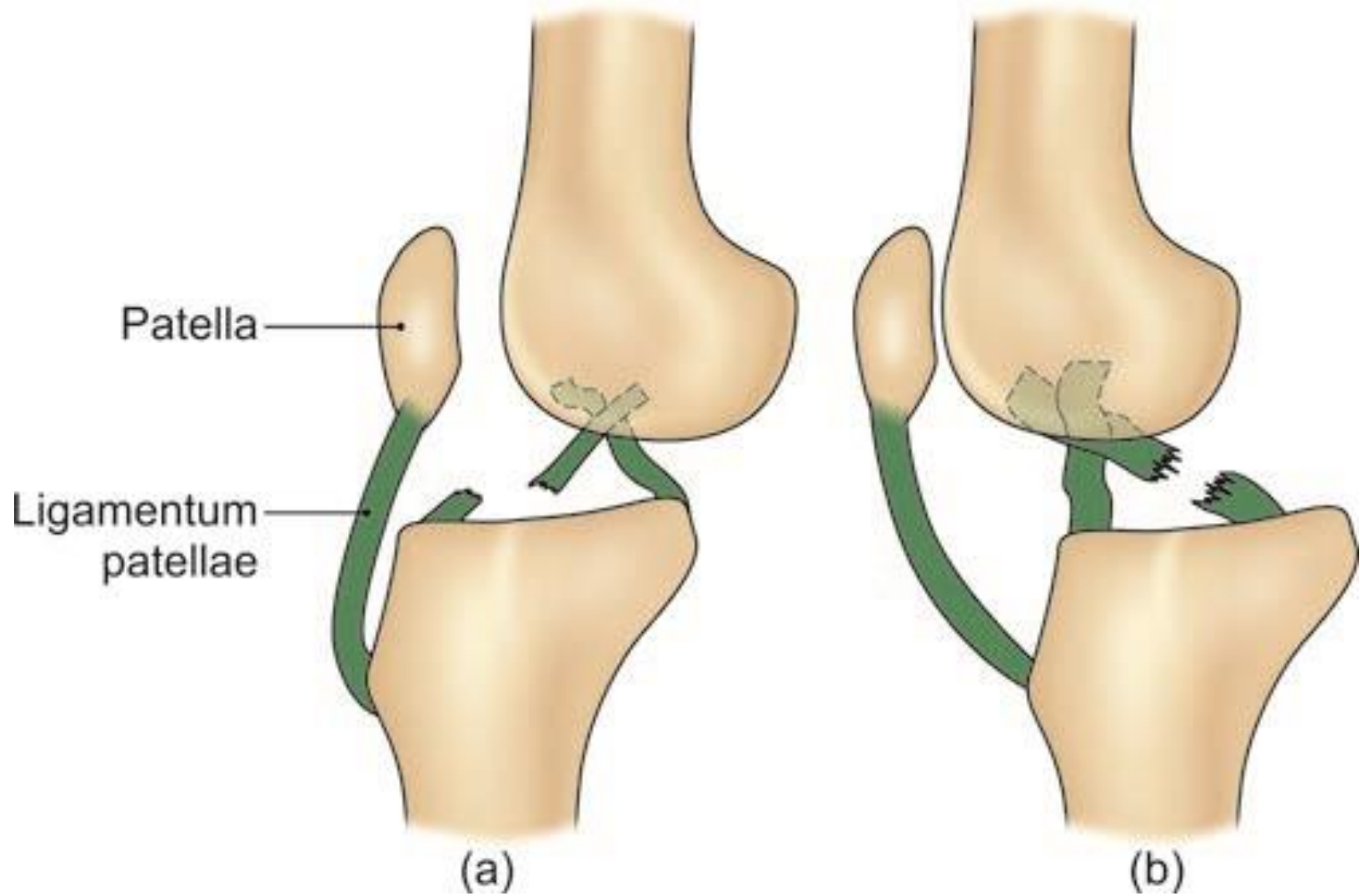
The locked knee joint can be flexed only after it is unlocked by a reversal of the medial rotation, i.e. by lateral rotation of the femur. Unlocking is brought about by the action of the popliteus muscle.

**Table 12.2: Muscles producing movements at the knee joint**

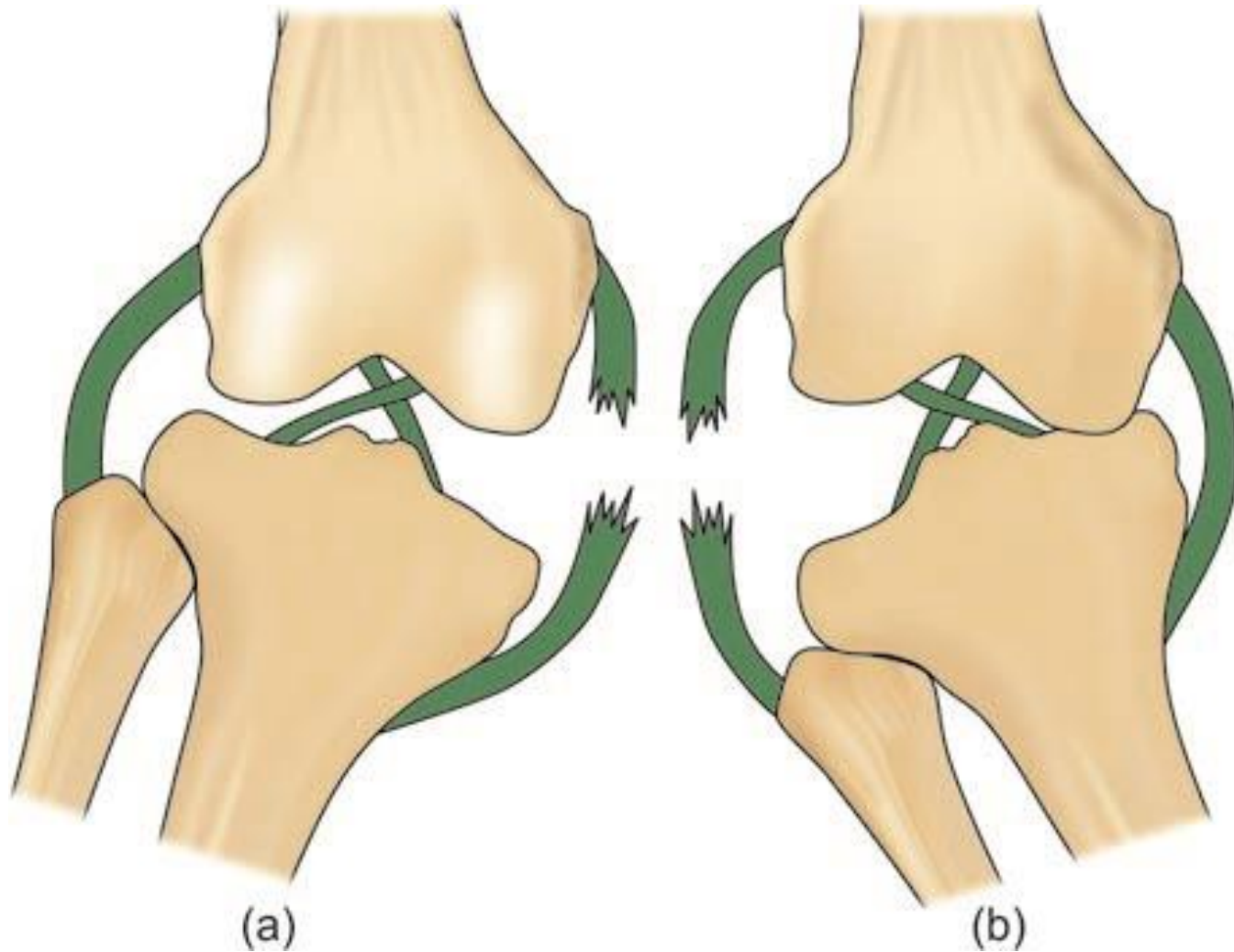
<i>Movement</i>	<i>Principal muscles</i>
A. Extension (from sitting on a chair to standing)	Quadriceps femoris (four heads)
B. Locking (standing in “attention”)	Vastus medialis
C. Unlocking (standing “at ease”)	Popliteus
D. Flexion	1. Biceps femoris 2. Semitendinosus 3. Semimembranosus
E. Medial rotation of flexed leg	1. Popliteus 2. Semimembranosus 3. Semitendinosus
F. Lateral rotation of flexed leg	Biceps femoris

# CLINICAL ANATOMY

- *Osteoarthritis*
- *Injuries to the knee:*
  - a. Injuries to menisci:
  - b. Injuries to cruciate ligaments
  - c. Injuries to collateral ligaments
- Hip joint and knee joint may need to be replaced if beyond repair.
- In knee joint disease vastus medialis is first to atrophy and last to recover.



(a) Rupture of anterior cruciate ligament, and (b) posterior cruciate ligaments



Rupture of: (a) Medial collateral ligament, and (b) lateral collateral ligament

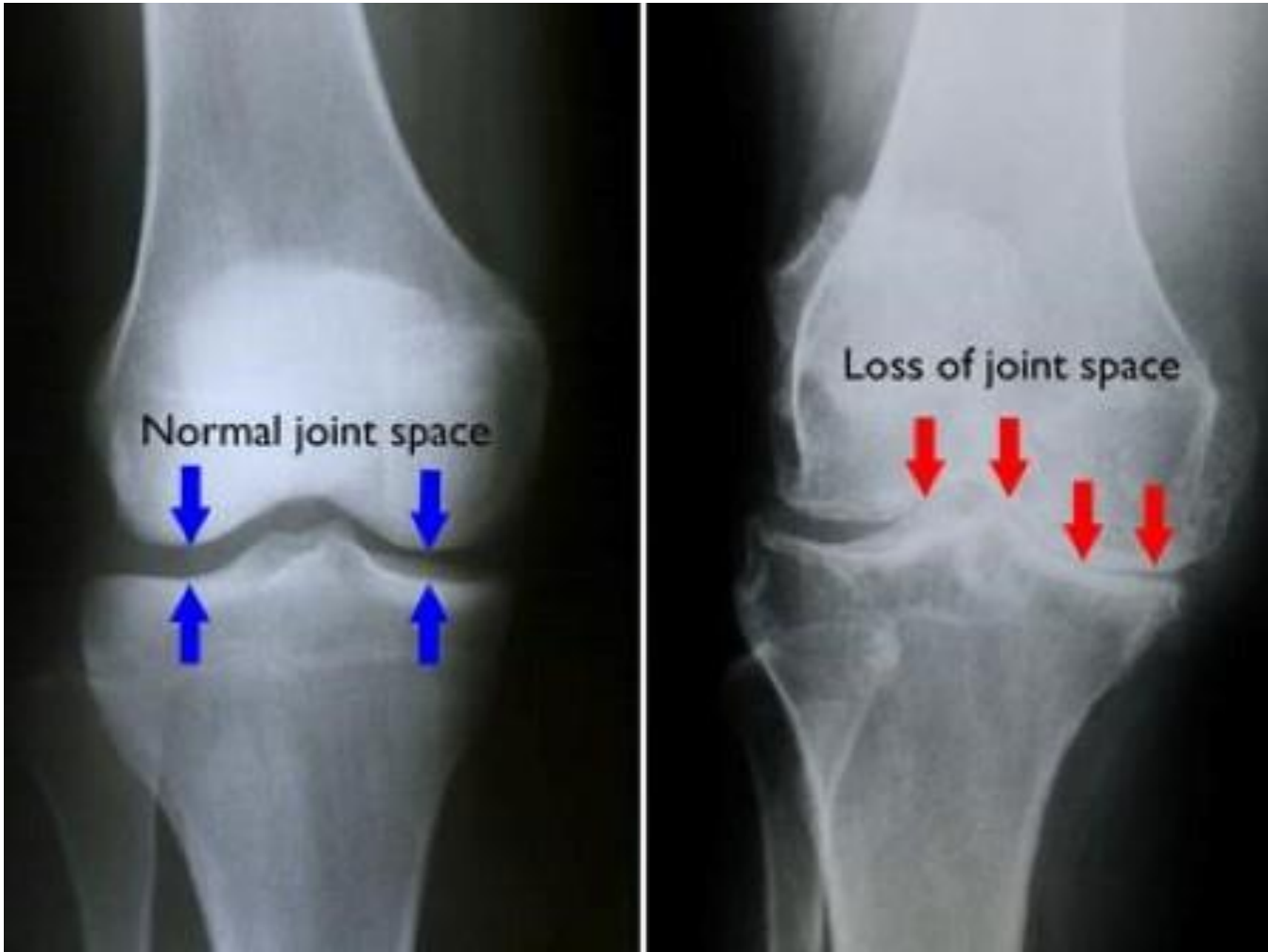
## FACTS TO REMEMBER

- Knee joint is the most complicated joint
- Flexion and extension are allowed in the upper compartment of knee joint while rotation is permitted in the lower or meniscotibial compartment.
- Locking muscle is vastus medialis part of quadriceps femoris.
- Unlocking muscle is popliteus.
- Inversion and eversion occur at talocalcaneo-navicular joint, assisted by movements at transverse tarsal joints, i.e. talonavicular and calcaneocuboid joints.
- Tendon of peroneus longus crosses the sole from

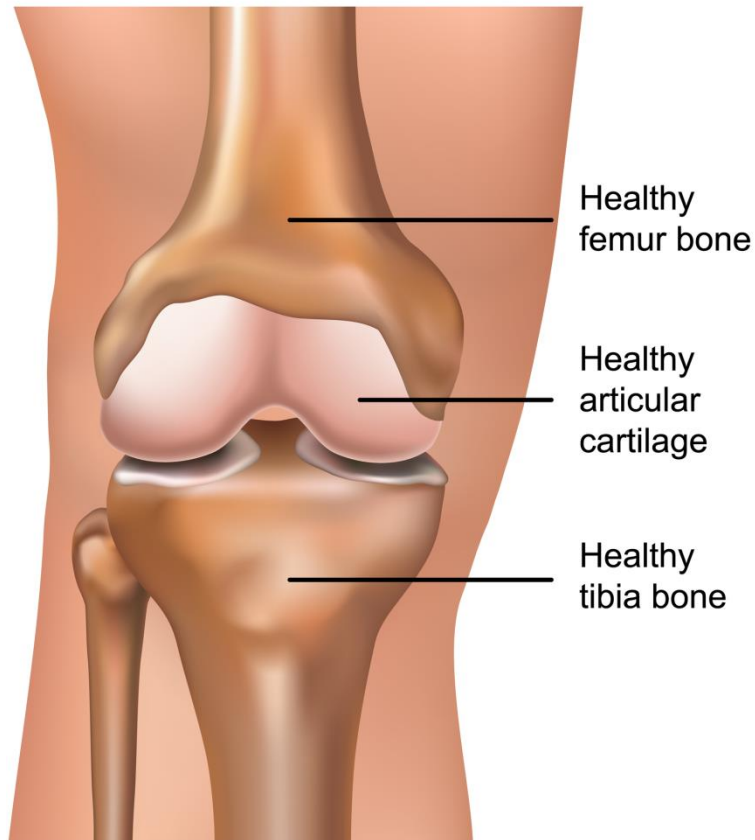
## **FACTS TO REMEMBER**

- Inferior tibiofibular joint is a syndesmosis type of joint, i.e. joint formed by ligaments only.
- Fibula does not take part in knee joint, but participates in the formation of ankle joint.
- Talus has no muscular attachment. Tendon of flexor hallucis longus courses between the two tubercles of its posterior process
- The big toe carries double the weight to the ground than any of other four toes.

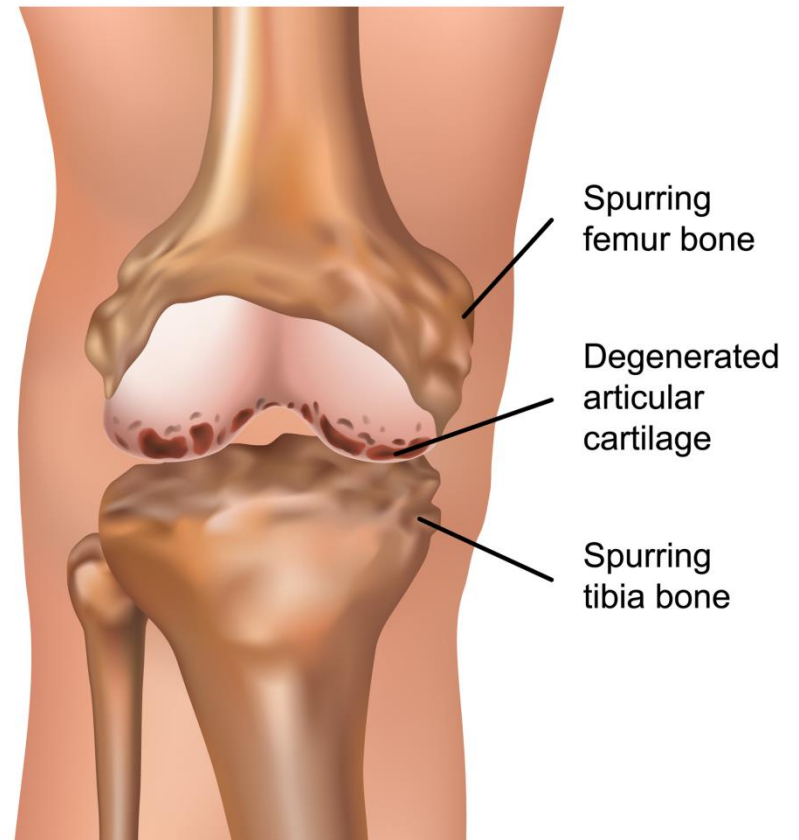
# Osteoarthritis



# Osteoarthritis of the Knee



Healthy knee joint



Osteoarthritis