**Final-Term Examination**

**Paper : Radiological positioning**

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**Semester 4th b.s radiology**

**Q1 :**

**Ans : dental OPG :**

These are special x-rays of the lower face, teeth and jaws. An OPG provides a panoramic view of the mouth, teeth and bones of the upper and lower jaws. The Lat Ceph results in a lateral or sideways view of the face.

An OPG is a panoramic or wide view x-ray of the lower face, which displays all the teeth of the upper and lower jaw on a single film.  It demonstrates the number, position and growth of all the teeth including those that have not yet surfaced or erupted. It is different from the small close up x-rays dentists take of individual teeth. An OPG may also reveal problems with the jawbone and the joint which connects the jawbone to the head, called the Temporomandibular joint or TMJ. An OPG may be requested for the planning of orthodontic treatment, for assessment of wisdom teeth or for a general overview of the teeth and the bone which supports the teeth.

There are three types of diagnostic radiographs taken in today's dental offices -- periapical (also known as intraoral or wall-mounted), panoramic, and cephalometric. Periapical radiographs are probably the most familiar, with images of a few teeth at a time captured on small film cards inserted in the mouth.

**patient positioning :**

In order to obtain diagnostically useful images, patients must be positioned carefully within the image layer or focal trough, which is a three-dimensional curved zone . Structures found within the image layer will be reasonably well-defined. The patient must be positioned correctly so that the proper structures are aligned within the image layer.

If patient positioning is incorrect, errors are likely to occur. Patient positioning errors are the most common type of error when performing panoramic radiography. For instance, in a study evaluating 460 panoramic radiographs, careless head positioning accounted for 38% of the errors. Patient positioning errors accounted for 85% in a sample of panoramic radiographs.

The most common patient positioning error occurs when the tongue is not placed close enough to the palate. This may be due to the patient misunderstanding the instructions and only placing the tip of their tongue on the palate. Incorrect positioning of the tongue creates radiolucency near the apices on the maxilla, which makes diagnosis of periodontitis and root resorption challenging.

It is helpful to note that each manufacturer provides specific operation instructions in the manual that accompanies the unit. It is worth the time and effort for each team member to become acquainted with the contents of the manual. While the instructions make panoramic imaging easy to perform well, it is equally as easy to perform badly when manufacturers’ instructions are not followed. Proper patient positioning Table 4will help reduce the possibility of errors in panoramic imaging.

Patient positioning is vital to a safe and effective surgical procedure. Proper patient positioning depends on the type and length of procedure, anesthesia access to the patient, devices required and other factors. Safely positioning the patient is a team effort. All members of the surgical team play a significant role in the process and share responsibility for establishing and maintaining the correct patient positions.

The goals of proper patient positioning include:

* Maintain the patient's airway and circulation throughout the procedure
* Prevent nerve damage
* Allow surgeon accessibility to the surgical site as well as for anesthetic administration
* Provide comfort and safety to the patient
* Prevent soft tissue or musculoskeletal and other patient injury.

**Q2 :**

**Ans : lower back pain :**

* X-ray. These images show the alignment of your bones and whether you have arthritis or broken bones. ...
* MRI or CT scans. ...
* Blood tests. ...
* Bone scan. ...

Most cases of back pain tend to get better without major medical intervention in six to eight weeks after the onset of the pain, Therefore, X-rays are usually not recommended until after back pain has been present for at least that long unless your physician suspects a problem such as spondylolisthesis or fracture may .

The evaluation for low back pain should include a complete, focused medical history looking for red flags, which include, but are not limited to: severe or progressive neurologic deficits (e.g., bowel or bladder function fever, sudden back pain with spinal tenderness, trauma, and indications of a serious underlying .

It is also important to rule out nonspinal causes of back pain, such as pyelonephritis, pancreatitis, penetrating ulcer disease or other gastrointestinal causes, and pelvic disease. Fractures are an uncommon cause of back pain; they are associated with risk factors such as osteoporosis and steroid use.

Most patients with radicular symptoms will recover within several weeks of onset. The majority of disc herniations will regress or reabsorb within eight weeks of onset. In the absence of progressive neurologic deficits or other red flags, there is strong evidence to avoid CT/MRI imaging in patients with non-specific low back pain.

Studies have shown that patients with no back pain often show anatomic abnormalities on imaging.Risks associated with routine imaging include unnecessary radiation exposure and  patient labeling.The labeling phenomenon of patients with low back pain has been studied and shown to worsen  patients’ sense of well-being.In addition studies have linked the increase rate of imaging with the increase rate of surgery.  A study by Webster et al showed that patients with occupation-related back pain who had early magnetic resonance imaging (MRI) had an eightfold increased risk of surgery.A study by Jarvik et al showed that patients with low back pain who had an MRI were more than twice as likely to undergo surgery compared with patients who had plain film imaging.

**lumber X-ray :** When focusing on the lower spine, an X-ray can help detect abnormalities, injuries, or diseases of the bones in that specific area. According to the Mayo Clinic, a lumbar spine X-ray can show whether you have arthritis or broken bones in your back, but it can't show other problems with your muscles, nerves, or disks. .

X-rays of the spine, neck, or back may be performed to diagnose the cause of back or neck pain, fractures or broken bones, arthritis, spondylolisthesis (the dislocation or slipping of 1 vertebrae over the 1 below it), degeneration of the disks, tumors, abnormalities in the curvature of the spine like kyphosis .

An X-ray is a useful test for many conditions. It can help your doctor understand the cause of chronic [back pain](https://www.healthline.com/health/back-pain) or view the effects of injuries, disease, or infection. Your doctor may order a lumbar spine X-ray to diagnose:

* birth defects that affect the spine
* injury or fractures to the lower spine
* [low back pain](https://www.healthline.com/symptom/low-back-pain) that's severe or lasts for more than four to eight weeks
* [osteoarthritis](https://www.healthline.com/health/osteoarthritis), which is arthritis affecting the joints
* [osteoporosis](https://www.healthline.com/health/osteoporosis), which is a condition that causes your bones to thin.

**Q3 :**

**Ans :** Knee pain is a common complaint that affects people of all ages. Knee pain may be the result of an injury, such as a ruptured ligament or torn cartilage. Medical conditions including arthritis, gout and infections also can cause knee pain.

Many types of minor knee pain respond well to self-care measures. Physical therapy and knee braces also can help relieve knee pain. In some cases, however, your knee may require surgical repair.

Awkward movements, falls and collisions, sudden twists, excessive force or overuse can result in a range of injuries to the knee joint and the structures supporting it. Common knee injuries include ligament, tendon and cartilage tears, and patello-femoral pain syndrome.  
  
Prompt medical attention for any knee injury increases the chances of a full recovery. Treatment options include physiotherapy, arthroscopic surgery and open surgery.  
  
**The structure of the knee**

The knee is a hinge joint, situated between the thigh bone and shin bones tibia and fibula Contraction of the muscles on the front of the thigh quadriceps straightens the leg, while contraction of the muscles on the back of the thigh (the hamstrings) allows the leg to bend at the knee. The end of the femur rests in the shallow cup of the tibia, cushioned by a thick layer of cartilage.  
  
At the front of the knee joint, the kneecap or patella sits in a groove at the lower end of the femur. The joint is further bolstered on each side by additional cartilages, which sit in between the knee joint. The bones are held in place by tough bands of connective tissue called ligaments. The entire joint is enclosed inside a tough capsule lined with a membrane and filled with lubricating synovial fluid. Extra capsules of fluid, known as bursae, offer extra cushioning.

**Tips to Reduce Knee Pain in Old Age**

1. Walking: As mentioned above, inactivity is the root cause of knee pain in most of the cases. ...
2. Massage Therapy: It helps in reducing mild pain in the knee. ...
3. Calcium: Add calcium preparations to your diet. ...
4. Cold compress: Applying cold compress is a great and simple way to get rid of pain and swelling in your knees.

**Q4 :**

**Ans :** [Head injuries](https://www.webmd.com/fitness-exercise/guide/head-injuries-causes-and-treatments) are dangerous. They can lead to permanent disability, mental impairment, and even death. To most people, [head injuries](https://www.webmd.com/fitness-exercise/guide/head-injuries-causes-and-treatments) are considered an acceptable risk when engaging in sports and other types of recreational activities. But there are steps you can take to lower the risk and protect yourself and your children.

Head injuries are injuries to the scalp, skull, or [brain](https://www.webmd.com/brain/picture-of-the-brain) caused by trauma. [Concussions](https://www.webmd.com/brain/concussion-traumatic-brain-injury-symptoms-causes-treatments) are the most common type of sports-related [brain](https://www.webmd.com/brain/picture-of-the-brain) injury with an estimated 1.6 million to 3.8 million sports-related [concussions](https://www.webmd.com/brain/concussion-traumatic-brain-injury-symptoms-causes-treatments) a year. A concussion is a type of traumatic [brain](https://www.webmd.com/brain/rm-quiz-amazing-brain) injury that happens when the [brain](https://www.webmd.com/brain/video/brain-training) is jarred or shaken hard enough to bounce against the skull. This can happen when two athletes collide or when someone falls and hits his or her head. It can also result from being hit in the head with a piece of sporting equipment. In a sport such as soccer, even "heading" the ball can cause a concussion. A concussion causes an alteration of a person's mental status and can disrupt the normal functioning of the brain. Multiple [concussions](https://www.webmd.com/brain/ss/slideshow-concussions-brain-injuries) can have a long-lasting, cumulative life-changing effect.

You don't have to be hit in the head to experience a concussion. An impact elsewhere on the body can create enough force to jar the brain. You also won't necessarily lose consciousness with a concussion. Concussions range from mild to severe. The effects may be apparent immediately, or they may not show up until hours or even days later.

* Cycling
* Football
* Basketball
* Baseball and softball
* Riding powered recreational vehicles such as dune buggies, go-carts, and mini bikes

According to the Brain Injury Association of America, the five leading activities responsible for concussions in children and adolescents aged 5 to 18 years of age are:

* Cycling
* Football
* Basketball
* [Playground](https://www.webmd.com/webmd/consumer_assets/controlled_content/healthwise/special/playground_safety-topic_overview_special_tp21187.xml) activities
* Soccer

The exact cause of headaches is not completely understood. It is thought that many headaches are the result of tight muscles and dilated, or expanded, blood vessels in the head. Although migraine headaches were previously thought to be due to dilated blood vessels in the brain, newer theories suggest that changes in brain chemicals or electrical signaling may be involved. Other headaches may be caused by an alteration in the communication between parts of the nervous system that relay information about pain, coming from the area of the head, face, and neck. Lack of sleep and poor sleep quality are often the cause of chronic headaches. Occasionally, there is an actual problem in the brain, such as a tumor or malformation of the brain, although this is rare.

X-ray.A diagnostic test that uses invisible electromagnetic energy beams to produce images of internal tissues, bones, and organs onto film.

A diagnostic imaging procedure that uses a combination of X-rays and computer technology to produce horizontal, or axial, images (often called slices) of the body. A CT scan shows detailed images of any part of the body, including the bones, muscles, fat, and organs. CT scans are more detailed than general X-rays.

**Q5: A**

**Ans :**

The first experiment showed that, when the film density is kept constant, the higher the kVp, the lower the resolution and image contrast percentage; also, the higher the mAs, the higher the resolution and image contrast percentage.

Two clinical experiments were conducted to study the effect of kVp and mAs on resolution and on image contrast percentage. The resolution was measured with a “test pattern.” By using a transmission densitometer, image contrast percentage was determined by a mathematical formula. In the first part of the experiment, the density of the film was kept constant by changing the kVp and mAs. In the second part of the experiment, different mAs's were chosen, and for each mAs, several kVp's were used. Five observers read the radiographs. The first experiment showed that, when the film density is kept constant, the higher the kVp, the lower the resolution and image contrast percentage; also, the higher the mAs, the higher the resolution and image contrast percentage. The second experiment showed that when the film density is not kept constant, the correlation between kVp and resolution and between kVp and image contrast percentage was the same as in the first experiment. However, there was negligible correlation between mAs and resolution and between mAs and image contrast percentage. A high positive correlation was found between resolution and image contrast percentage, but a high negative correlation was found between resolution and film density.

refers to the number of photons produced during an exposure.

Factors influencing x-ray quantity includes:

* peak voltage (kVp): beam quantity is approximately proportional to the square of the tube potential
* [generator](https://radiopaedia.org/articles/high-voltage-generator?lang=gb) type/voltage waveform: reducing ripple increases beam quantity
* beam [filtration](https://radiopaedia.org/articles/filters?lang=gb): increasing filtration reduces beam quantity
* distance from the beam: [inverse square law](https://radiopaedia.org/articles/inverse-square-law?lang=gb)
* current (mA): beam quantity is directly proportional to current
* exposure time (seconds): beam quantity is directly proportional to exposure time
* anode material: beam quantity is directly proportional to the atomic number . of the [anode](https://radiopaedia.org/articles/anode-1?lang=gb) material

**X-ray photons quality**

 relates to the x-ray spectrum changes and the effective photon energy. The effective photon energy is approximately equal to between one third to one half of the maximum photon energy.

Factors influencing x-ray quality include:

* peak voltage (kVp)
* voltage waveform: reducing ripple increases quality
* beam filtration: increasing filtration increases quality through beam hardening
* anode material: photon energy depends on the binding energies of shells in the anode material.

**Q5 : B**

**Ans : A pelvis X-ray**

is a safe and painless test that uses a small amount of radiation to take a picture of the pelvic bones, which surround the hip area. During the examination, an X-ray machine sends a beam of radiation which surround the hip area. During the examination, an X-ray machine sends a beam of radiation through the pelvis and an image is recorded on special film or a computer. pelvis and an image is recorded on special film or a computer.

An X-ray is a common imaging test that has been used for decades to help doctors view the inside of the body without having to open it up using surgery.

X-ray imaging went public in 1896 when Wilhelm Rontgen, who discovered X-ray imaging, took an image of the hand of anatomist Albert von Kolliker. In the hundred years or so that followed, X-ray technology has become a key element in the identification, diagnosis, and treatment of many types of medical conditions.

Today, different types of X-rays are available for specific purposes. An X-ray of the pelvis focuses specifically on the area between your hips that holds many of your reproductive and digestive organs. Your pelvis is made up of three bones, the ilium, ischium, and pubis, and it also forms your hip joint.

Like all X-rays, this test uses a small amount of radiation, so it’s generally not recommended for pregnant women or small children unless the risks of not taking it are greater than taking it.

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## Why is an X-ray of the pelvis done?

Your doctor may order a pelvic X-ray for numerous reasons. Often, an X-ray is taken after a traumatic event, such as a car accident or a fall.

A pelvic X-ray can help your doctor detect various conditions, such as:

* arthritis that affects your hip
* inflammation where your sacrum joins the ilium, which is called sacroiliitis
* pelvic fractures
* hip dislocations
* stiffness of the spine or sacroiliac joint, which is called ankylosing spondylitis
* tumors

**the end**