# *Name: Hafeezullah*

*ID#: 14941*

*Program: Bs Radiology*

*Submitted to: Waqas Ihsan*

*paper: Radiation Sciences and Technology*

*Date: 19/08/2020*

*Q no:-1*

*Ans :- operating console and high voltage generator of the x­-ray imaging system:-*

*THE OPERATING CONSOLE:-*

*\* This is the part of x-ray imaging system most familiar to the radiologic technologist because it allow us to control the x-ray tube current and voltage so that the useful x-ray beam is of proper quantity and quality (the number of x-ray or the intensity of the x- ray beam and expressed in milliroentgens (mR) or milliroentgens /milliampere-seconds(Mr/ Mas) and quality (refer to the penetrability to the x-ray beam and expressed in kilovolt peak (kVp)or more precisely called the half value layer.)*

*\*: Radiation quantity refers to the number of x-ray or the intensity of the x-ray beam. Radiation quantity is usually expressed in mR or mR/mAs. Radiation quality refers to the penetratbility of the x-ray beam and is expressed in kilovolt peak (kVp) or,more precisely, half value layer (HVL).*

*\*: operating consoles has an on/off controls to select kVp , mA ,and time or mAs. Furthermore, operating consoles usually provides for control of line compensation, kVp , mA and exposure time. In modern consoles that incorporate AEC have a separated controls for mAs. The ACE is also found in operating console.*

*OPERATING CONSOLE CONTROLS:-*

*\*: The control will have controls for:*

*\*: mA and time or mAs.*

*\*: kVp.*

*\*: focal spot.*

*\*: line voltage compensation.*

*\*: automatic exposure control.*

*\*: High Voltage Generator:-*

*The high voltage generator of an x-ray machine is responsible for increasing the output voltage from the auto transformer to the kVp necessary for x- ray production. On high voltage generator, some heat is generated in the high voltage section and is conductedto oil. The oil is used primarily for electrical insulation. The high voltage generator may be housed in an equipment cabinet positioned against a wall, and it is always close to the x-ray tube, usually in the examination room. A few instalations take advantage of false ceilings and place these generators out of sigh above the examination room. For newer generator designs that use high-frequency circuits require even less space in the examination room.*

*Q NO: (2)*

*ANS: EXTERNAL COMPONENTS of the x-ray tube:-*

*\*: Tube support.*

*\*: Glass/metal envelop.*

*\*: Protective housing.*

*\*: Cathode.*

*\*: Anode.*

*\*: tube support:-*

*\*: x-ray tube and housing assembly are quite heavy, and therefore require a support mechanism so that the radiologic technologist can position it.*

*\*: ENVELOP (GLASS/METAL):-*

*\*: The glass enclosure is made of pyrex glass.*

*\*: the envelope maintains a vacuum inside the tube to allow more efficient x-ray production and longer tube life. Usually all current high-capacity x-ray tube use metal enclosures.*

*\*: the primary functions of the envelope is to provide support and electrical insulation for the anode and cathode assemblies.*

*\*: Protective housing:*

*\*: the tube is housed in a lead lined metal protective housing.*

*\*: the x-ray photons are generated isotropically or in all directions.*

*\*: the housing is designed to limit the beam to window.*

*\*: Cathode:*

*\*:Cathode is the negative side of the x- ray tube and consists of the following two part.*

*1: Filament.*

*2: focusing cup.*

*\*: Filament:-*

*\*: filament is a coil of wire usually 2 mm in diameter and 1 or 2 cm long.*

*\*: the filament are made of tungsten.*

*\*: Focusing cup:-*

*\*: the filament is embedded in a metal cup called the focusing cup.*

*\*: the purpose of the focusing cupis to guide the electron stream to the target area on the anode. Because of the tremendous amount of heat that is generated at the cathode, the structure is made of tungsten which has excellent thermal properties.*

*\*: Anode:-*

*\*: the anode is the positive side of the x-ray tube, electricity is conducted and radiates heat and contains the target. the anode must be a good thermal dissipater. Because when the projectile electrons form the cathode interact whit the anode, more than 99% of their kinetic energy is converted into heat. This heat must be dissipated quickly. Most common material used is tungsten but copper, molybdenum, and graphite are also common anode materials.*

*Q NO (3)*

*ANS :- THREE FUNCTIONS THAT ANODE SERVES IN AN X-RAY TUBE:-*

*\*: x-ray tube target, electrical conductor, mechanical support, and thermal radiation.*

*\*: the convert electronic energy into x-ray radiation.*

*\*: the dissipate the heat created in the process. The material for the anode is selected to enhance these functions*

*(OR)*

*(1): Receives the electrons emitted from the cathode.*

*(2): it is a electrical conductor.*

*(3): Mechanical support for the target.*

*( The End )*