

INTRODUCTION.. =

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SEMESTER = 3rd

SUMMER = MID Term.

(1)

Q) QNO : 01

What do you know about
Operating Console and high
voltage generator of
the X-rays imaging
System?

Ans Operating Console:

The console is the part
of machine that operates
the control operation
of X-rays machines.

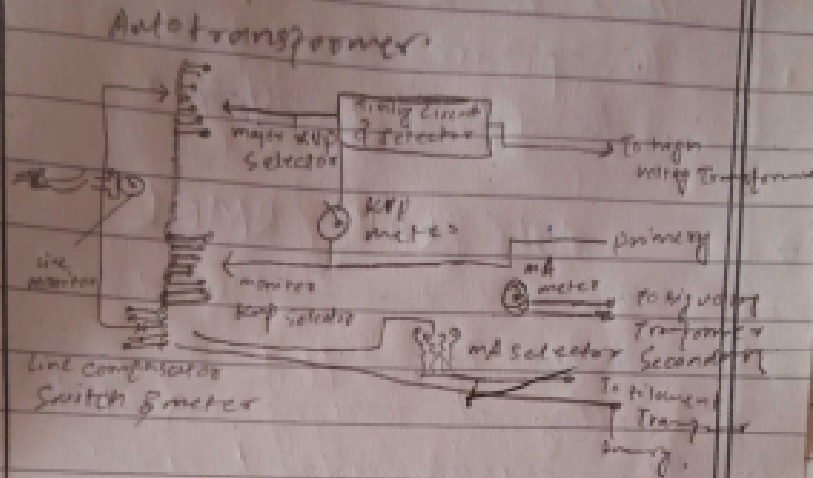
- All machine consoles are
little different but
there are always similarities
The console is where we control
X-ray tube current and voltage.

→ The console will have control
 knobs:

- MA and time or mAs
- kVp
- focal spot

(a)

Line voltage compensation Automatic Exposure controls



Line compensation

It the bottom left is

The control for line voltage compensation

Most machines are designed to operate at 900 volt while some will work with 110 volts or 440 volts

- Older machine have a meter to monitor the line voltage attach to the autotransformer.
- The operator can adjust the tap of transformer

AUTO TRANSFORMER

- The aut transformer is design to supply the voltage of varying magnitude to several different circuits of the x-ray machine including both the filament circuit and high voltage circuits.

KVP Adjustment.

most consoles will have one or two knobs that change the taps on the autotransformer for major or minor kvp. modern unit LED to readout kvp.

(4)

- mA controls
- The number of electron crossing from the cathode to anode per second is measured in mA
- It is the quantity of electron is determined by filament temperature
- The filament is normally operated at current between 3 and 6 A
- The tube current is controlled through separate circuit called filament circuit

⇒ Exposure Timer

- The timer circuit is separate from the main circuit
- It consists of mechanical or electronic devices whose action is to make the break the high voltage across the tube on the primary side of the high

high voltage Section.

There are five Timers

Mechanical Timer

→ very simple device that has a clock mechanism

→ Operator turn the dial to the desired time As it

unwinds the exposure is made.

→ very old and dental units.

(ii) Electronic Timer

→ most exposure timer are

electronic and are controlled by microprocessor.

(iii) MAS Timers

→ Most modern machine are

designed to accurately control

the tube current and Exposure time.

(6)

(iv) Automated Exposure Control
- With AEC the operator
can select:

Where to read the
radiation

The desired film density
kvp and backup mAs.

→ HIGH VOLTAGE GENERATOR

The high voltage generator
is responsible for increasing
the out put voltage from the
Autotransformer to the kVp
necessary for x-ray production
It is usually enclosed in
a lead metal container in
x-ray rooms.

It consist of three primary
Section.

(1) High Voltage transformer.
- It is step up transformer
- no more windin on Secondary
- Sid capped to primary
Sid.

(7)

- only different is amplitude.
- input voltage is converted to output. kilovolts

(8) Voltage Rectification.

- Transformer operate with alternating current
- To convert AC to DC we use rectifier.

a

Q NO : 02

Write Note on external component of x-ray tube?

Ans

External Component

The x-ray tube and housing assembly are quite heavy therefore they require support mechanism

- There are three main parts
Support Structure

w

Ceiling Support System

The ceiling support system have two perpendicular

set of ceiling mounted rail

which allow for both longitudinal and transverse travel

Allow variable SID and prefer detand position

- (9)
- 9 Floor To ceiling Support
- In this system the x-rays tube move up and down the column as the column rotates

- (3)
- C-Arm Support System.
- Shaped like "C" and is very flexible and ceiling mounted.

- i) Protective Housing.
- Provide mechanical support for the tube.
- designed to reduce the level of leakage radiation to less than 1 mSv/h when operated at maximum condition.

10

iii)

Glass or Metal Enclosure.

- It is relatively long perhaps 30 to 50 cm long and 20 cm in diameter.
- It is made of pyrex glass to enable it to withstand the tremendous heat generated.

3

QNC : 03

Q

What are the three functions that find serve in x-ray tube?

Ans (a) Electrical conductors

→ It receive electron emitted by cathode and conduct them through the tube to collecting anode and back to high voltage generator. The anode provide mechanical support for the target.

Thermal dissipater.

Anode must be thermal dissipater

When the projectile electron from cathode interact with anode more than 99% of this kinetic energy is converted into heat. This heat must be

dissipated quickly.

Copper, molybdenum and graphite are the most common anode material.

Adequate heat dissipation is the major engineering hurdle.

Target

The target is the area of anode struck by the electron from the cathode.

The target consists of Tungsten alloy embedded in the copper anode.

The anode serves to house target material.

In rotating anode tube the entire rotating disc is target.

12

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The End