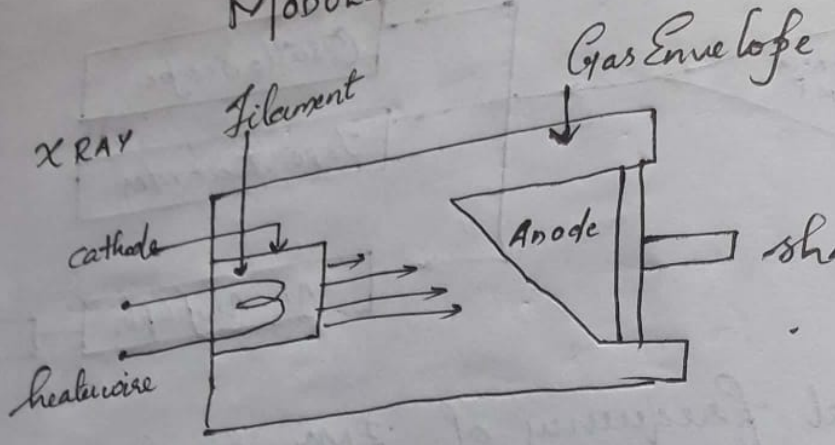
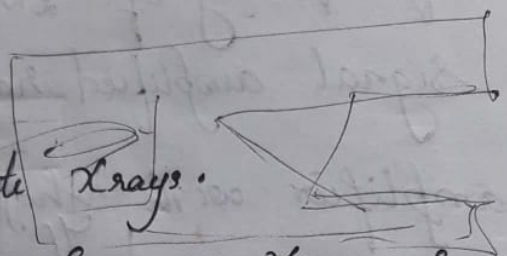
MODULE V

8/a





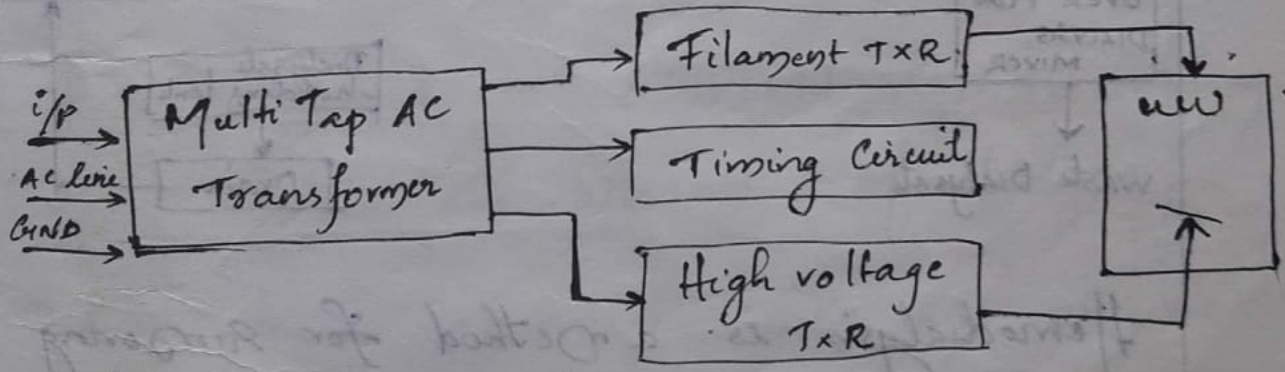
An Xray generate Xrays.

Xray imaging s/m has a Xray source of or Xray generator (Xray tube) and an image detution s/m. The Xray tube operates by emitting electrons from a heated cathod Tungstem filament towards a Rotating high voltage anode disc. The point where the electrons strikes the target is called focal spot. At focal spot, X ray photons are directed to all direction The image are received & viewed on a photographic plate. Here the light & dark areas on film represent high &

low tissue penetration.

Xray m/c work by applying control voltage & current to the Xray tube So the beam intensity of Xrays can be controlled by controlling voltage or Current. The beam is projected on the object. Some of the beam will pass thro' the object and some are absorbed. The resulting pattern of radiation can be obtained in photographic film. Anode is made of tungsten alloy which helps in avoiding over heating.

X RAY M/C BLOCK DIAGRAM.



Adv. of Xray

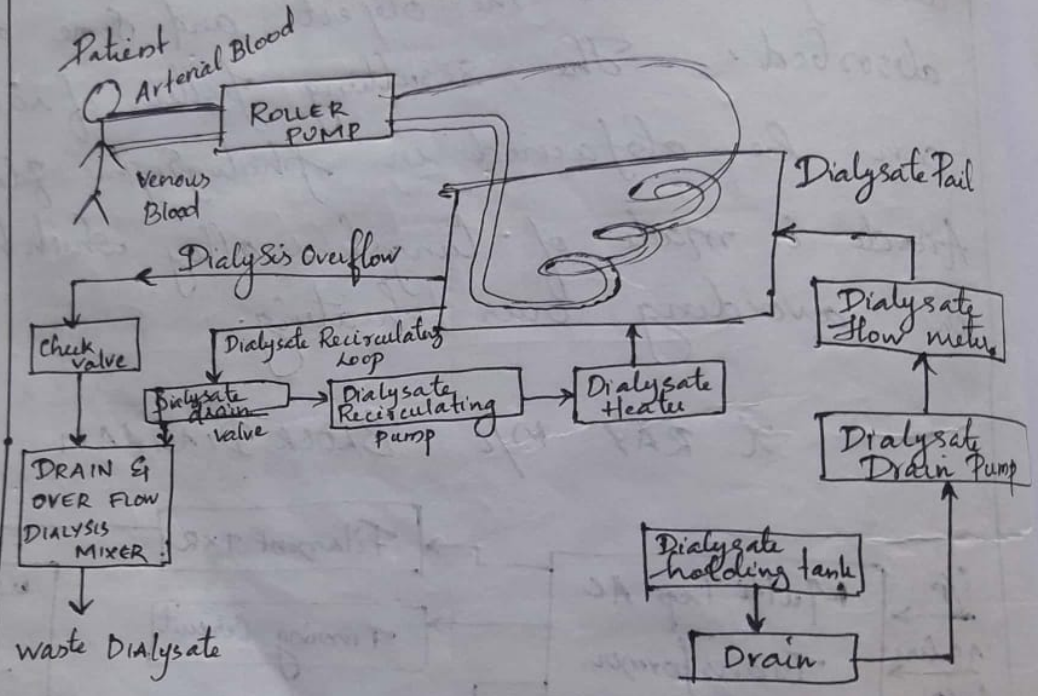
→ fast result
→ Easy technique is used
→ Less cost
→ image of any body part
→ Available in portable unit
→ So Xrays can be taken anywhere

even in bedside

CT SCAN. → In drives note.

~~Block~~

H/EMO DIALYSIS MACHINE (ARTIFICIAL KIDNEY).



Hemodialysis is a method for removing waste products such as potassium, urea from the blood when the kidney is failed.

The chemical substance are removed from the blood by passing it through

tubes surrounded by semipermeable membrane. It is done by inserting two needles through artery and vein and circulating the patient's blood through a coiled plastic tube. The coiled tube is immersed in a dialysing solution. (soln containing salts of Ca^{+}, Mg, Na, K etc)

The dialyser soln used is sterilised soln of mineral ions, Sodium bicarbonate is added in a higher concentration than plasma to correct blood acidity. Small amount of glucose is also added to the solution.

Fluid removal is achieved by alternating the hydrostatic pressure of dialyser.

The toxic chemical such as uric acid urea are gradually passed thro' the plastic tube into the soln.

The Semipermeable membrane doesn't allow blood cell / large protein molecules to pass thro' it.

15th March '19

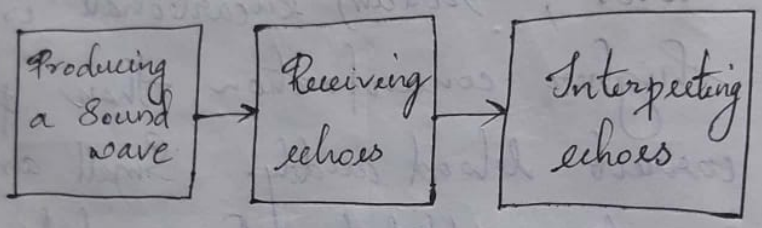
Ultra Sound Scanning

Ultra Sound means waves with frequency above human hearing ie, 20 kHz.

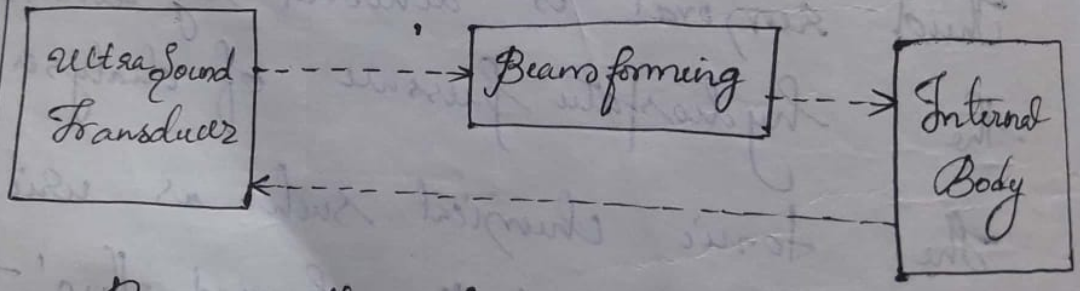
Ultra sonography is an ultrasound based diagnostic image techniques.

It is mainly used to visualise internal body organs.

(i) Ultra Sound Transducers.



(ii) Producing a Sound Wave



(iii) Receiving the echoes.

⇒ Reflections → Ultra Sound Transducer → Ultra Sound Scanner → Digital Image

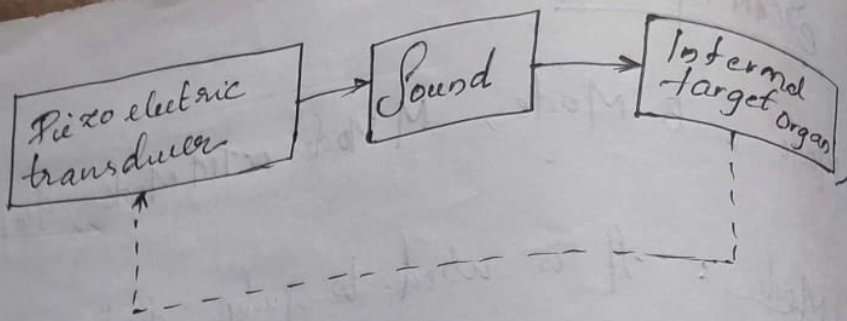
(iv) Forming the images

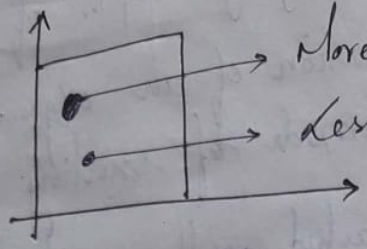
Scan Modes:

A Mode, B Mode, M Mode or TM Mode, Dopler Mode.

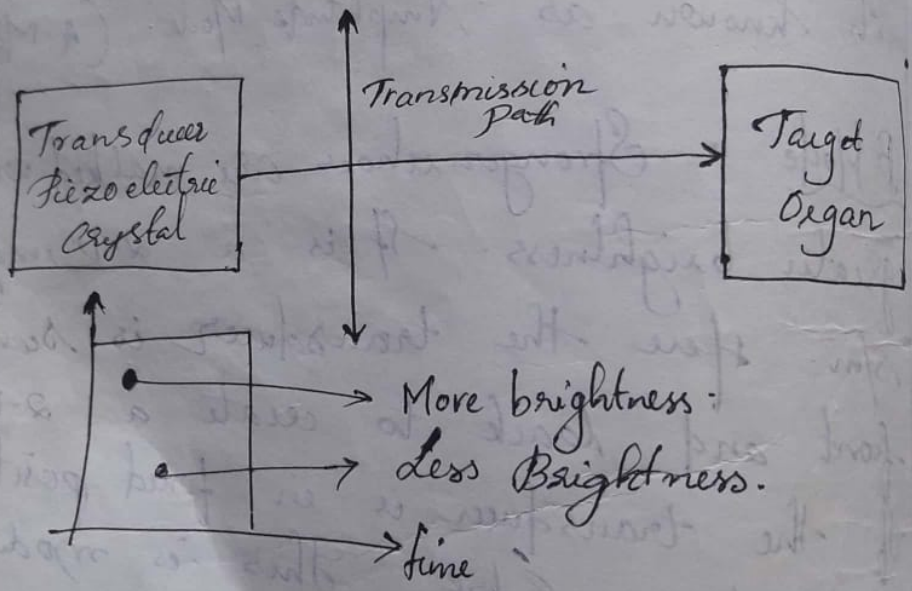
A Mode: It is used to judge depth of an organ otherwise estimate dimension of an organ. It is simple & oldest mode of scanning. ~~Strong~~ Small echoes are marked with greater amplitude & weaker echoes are " with less ". Hence it is known as Amplitude Mode. (A Mode).

B Mode: Stronger echoes are marked with greater brightness. It is a 2-D imaging s/m. Here the transducer is scanned front and back to create a 2-D view. If the transducer is in fixed position & it produces pulse, This is modified 2-D B Scanning. These pulse are directed to concentrate on the organs by 2-D scanning schemes.





Modified 2-D Scan.



M Mode or TM Mode

M mode scan means motion scan. It is enable to measure the motion. It is also known as time motion mode. (TM mode) The instaneous position in the scanning

produces deep information on one axis and fine information on other axis.

Doppler Mode

This is a special scanning mode to measure blood with doppler effect. Doppler effect is the change of frequency that occurs when the transmitter and the receiver moves relatively with each other. The frequency shift is given by,

$F = 2V \cos\phi$ where V is the relative velocity and ϕ is the angle b/w transmitter & receiver.

Diathermy

It means through heat. It is defined as high frequency electromagnetic wave that heats tissues upto 5cms depth and heat is produced by the resistance of tissues to the passage of energy. There are two classifications

① Medical diathermy
② Surgical diathermy

Medical Diathermy is used for heating the tissues and Surgical " is used for burning the tissues.

Classification of Medical Diathermy

- Microwave
- Short wave.

Microwave diathermy uses high frequency electromagnetic wave (2415 mega Hz) wavelength at 11 metre to the tissues.

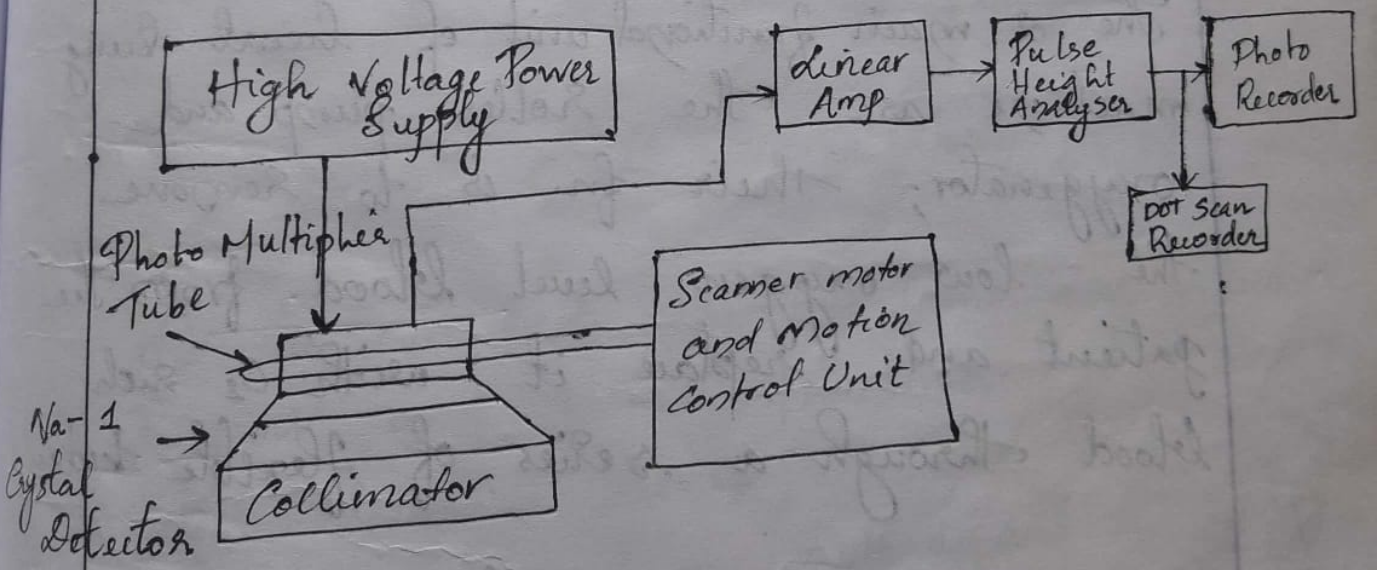
Short wave diathermy uses high frequency electromagnetic waves ie similar to radio waves from 10 - 100 MHz to heat deep tissues.

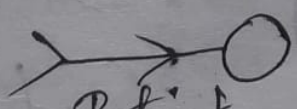
Micro wave.	Shortwave.
2456 to 915 MHz	10 - 100 MHz
Heating due to electric field	Heating due to magnetic field
Can Create hot spot	~~link~~ unlikely to create hot spot
Spacing required b/w skin & application.	Can apply directly to skin.

Nuclear Medicine System

It is a special s/m, that uses radio active isotopes for diagnosis and treatment of diseases. The common radio active isotopes are iodine 123, iodine 131, Gallium 67 Thalium 201 etc.

The nuclear medicine s/m will count the radio active decay from isotopes to measure whether the target organ is working or not. It can be done by comparing with std. values of radio active decay.





unit.

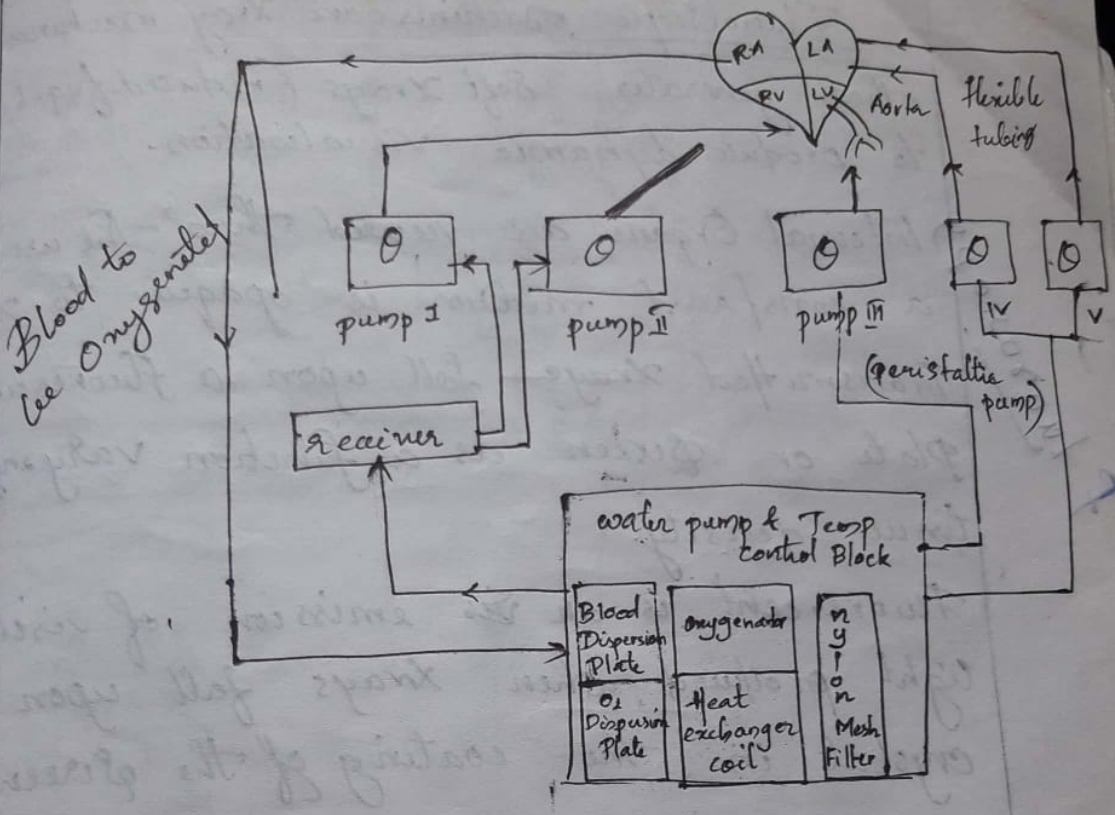
HEART LUNG M/C

These are designed in such a way that they can temporarily take over the fn. of heart and lungs during surgical purpose by maintaining the circulation of blood & O_2 content of the body. The operation requiring opening of the heart during surgical purpose requires the use of heart lung m/c to support the fn. during this period.

The 2 main functional unit of heart lung machine are the roller pump and oxygenator; their fn. is to remove the low oxygen level blood from the patient and replace it with O_2 rich blood through a series of flexible tubes

Block Diagram of

Heart Lung M/c.



Diagnostic Still Picture Xray

It is used to examine bones and internal organs and tissue structures. It is used to detect broken bones

Wavelength used is .01 to 1 and the energy level varies with the tissues to be observed.

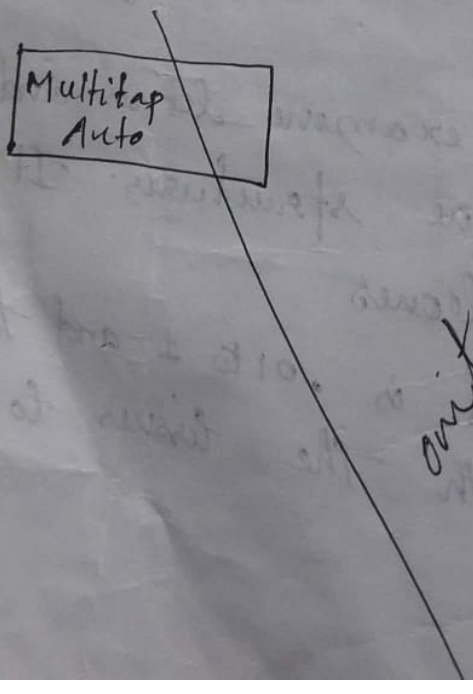
Fluoroscopy

Fluoroscopic machines are xray machines that generates soft xrays (reduced freq. & intensity) to produce dynamic visualisation.

Internal Organs are viewed thro' the use of a constrast medium ie opaque to xray. Transmitted xrays fall upon a fluorescent plate or screen as a function varying tissue density.

Fluorescent is on emission of visible light produced when xrays fall upon crystal in the coating of the screen.

Block diagram.



chines
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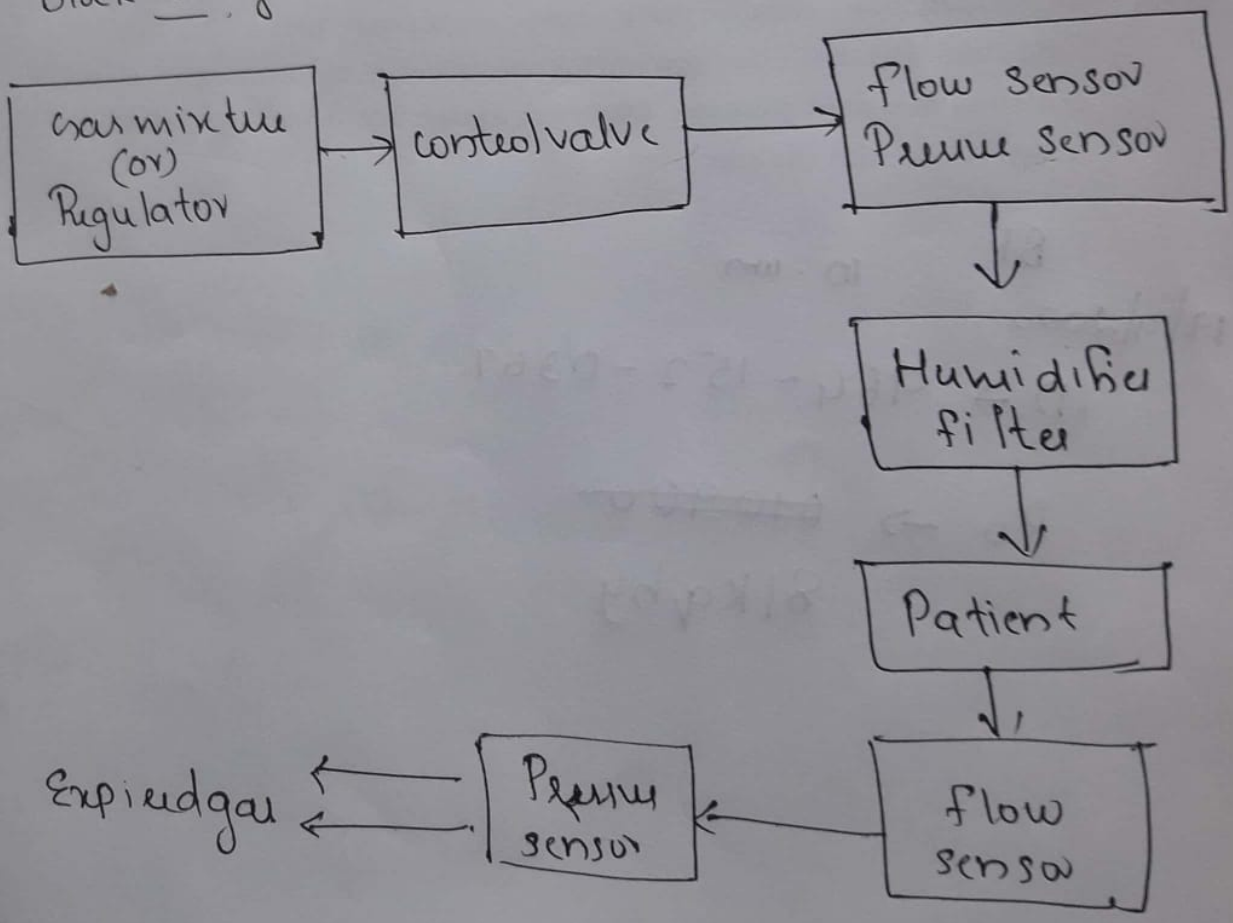
Fluoroscopy

Ventilator [respirator]

- Positive pressure ventilator
- Negative pressure ventilator
- Assist mode
- control mode
- Assist control mode

Block diagram



20 March

VENTILATION

Ventilators is otherwise called respirator. When an artificial ventilation is forovided to the patient for a long time. The main fu. of the ~~respir~~ ventilator is to ventilate the lungs similar to natural ventilation.

It can be (i) positive pressure ventilator
(ii) -ve pressure ventilator

+ve Pressure ventilator

Most ventilators use normally in positive pressure condition where the inspiratory flow is generated by applying a +ve pressure greater than atm pressure. They are commonly used in ICUs and CCUs.

-ve Pressure Ventilators

It is mainly used in peak & paralysed patients. Here a -ve pressure is generated on outside the patients chest and transmitted to the interior

to expand the lungs and allows the air to flow in. It is only used in two situations like patients with neuromuscular disorder.

They are also classified into

(i) Assist Mode.
(ii) Control Mode
(iii) Assist-Control Mode.

Assist Mode : A patient is able to control their breathing but unable to take suffient amount of air

Control mode.

This type of ventilators are required especially for patients who are unable to breathe themselves. Their breathing is controlled by a timer set to provide desired respiration state.

Assist Control Mode

It has both the features of above two. Here the assist mode triggers the patients'

attempt to breath, if the patient fail to breathe within a predetermined level, the control mode comes into action & timer automatically triggers the device. The

(iii)

The assist control mode is mainly used in CCU.

The ventilators can also be classified into (i) pressure Cycle (ii) Volume Cycle (iii) Timer Cycle.

Pressure Cycle.

In some patients, the pressure of the breathing air will not be specified Peak airway pressure. It will deliver gas to the patients as predetermined level of pressure.

(ii) Volume Cycle ventilator.

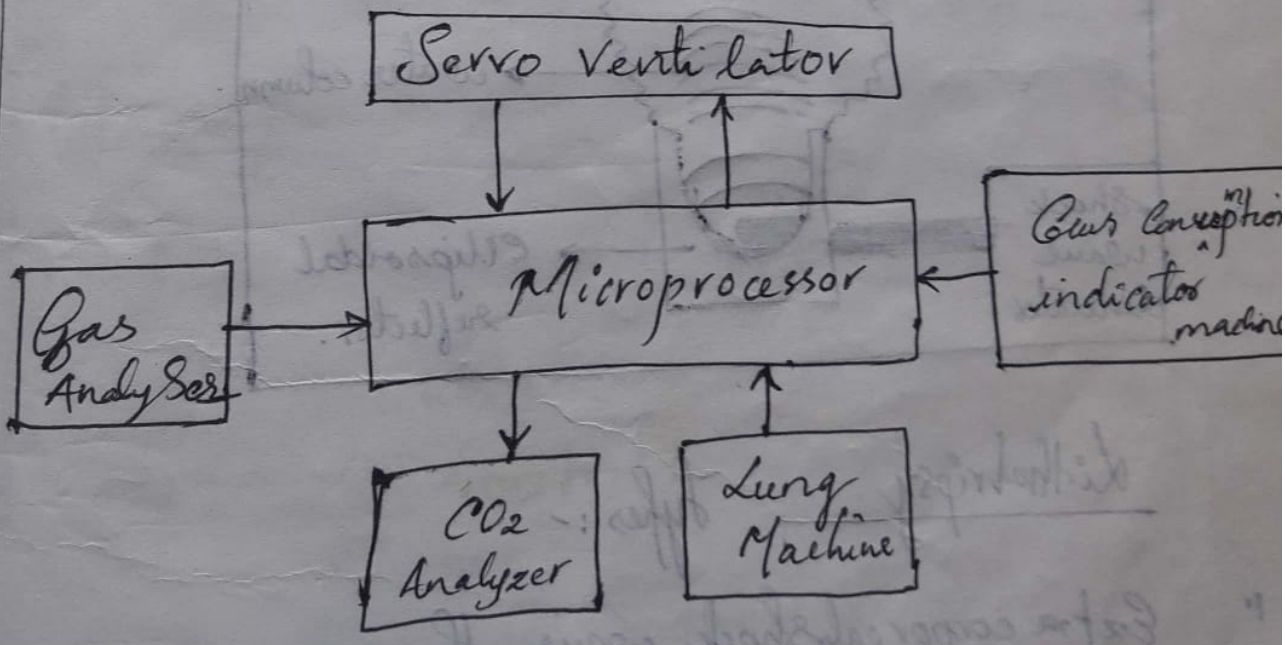
Due to various lung disorder caused due to smoking Problems Patients can't inspire upto

desired volume. These ventilators help to continue to inspire the specified vol. of gas to the patients.

(iii) Time cycled Ventilator

The patient is supplied with O_2 & other gases for a certain period of time.

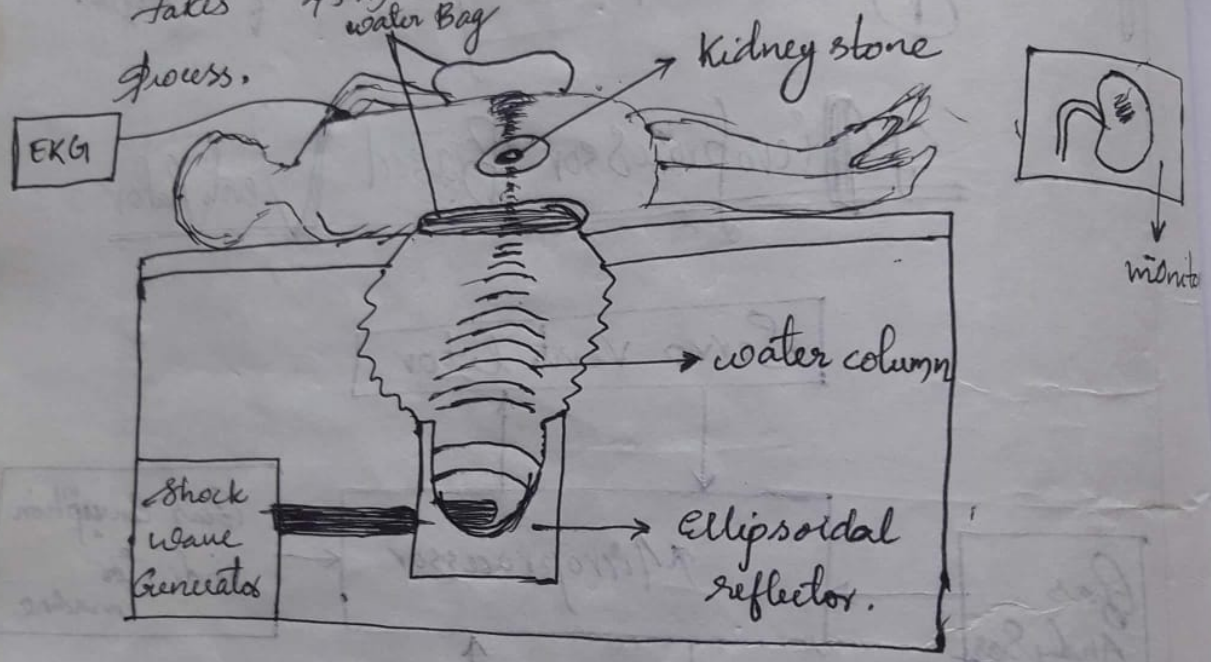
Microprocessor Based Ventilator



21/3 **Lithotripsy**

Its the process that uses shock waves to break up stones in kidney, bladder or in kidney tubes.

After these procedure, tiny pieces of stones pass out of the body through urine. It takes 45 mins to 1 hour to complete this process.



Lithotripsy Types :-

1. Extra corporeal shock wave therapy.
2. Intra corporeal (endoscopic Lithotripsy)
   - Ultrasonic lithotripsy
   - Mechanical Lithotripsy
   - Electrohydraulic lithotripsy
   - Laser Lithotripsy.

Infant Incubator

It is an apparatus for maintaining infant especially a premature baby in an environment of controlled temperature, humidity and O_2 concentration. It consist of simple alarm s/m to alert if there is any danger of overheating of the device. In some cases power is reduced automatically to ~~maintain~~ prevent overheating.

Main functions

1) Temperature control
2) O_2 concentration
3) Humidity control
4) Breathing gas ~~control~~ filtration

Types
1) Portable & Non portable
2) Open Box type
3) closed type
4) Double walled.

Angiogram

It is an imaging test that uses Xrays to produce the route map of bodys blood vessels.

arteries : Arteriogram
veins : Venogram.

Types

(i) Coronary Angiography
(ii) Cerebral Angiogram
(iii) Peripheral Angiogram
(iv) Pulmonary Angiogram
(v) Lymph Angiogram.
(vi) Magnetic Resonance Angiogram
(vii) MRI : study of Blood vessels.
(viii) Retinal Angiogram.

1905

Endoscopy is the examination & inspection of the interior body organs, joints or cavities through an endoscope allow physicians to feel through the body part way.

An endoscope is a device using fibre optics and powerful lens s/m to provide lighting & visualisation of interior body org The portion of endoscope inserted into body may be rigid or flexible depending upon the medical process.