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* **DEPT BS-MLT (4TH SEMESTER)**
* **SUBJECT BIMEDICAL INSTRUMENTATION.**

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**Q1:**

**Ans: Microscope:**

 🡺 Microscope is an optical instrument which is used for viewing very small objects which normally can’t be seen through necked eyes such as mineral samples, animals, or plant cells, and magnified these cells several hundred times.

**🡺Principles: -**Microscope work on three important features

1. **Magnification:**
* To magnify the images or to enlarge the images
* The magnification power of a simple microscope is given by







1. **Resolution:**
* The ability of microscope to distinguish two particles or separate the details of two particle in image.
1. **Contrast:**
* Contrast is the ability of an optical to produce the detail visible to eyes.

**Q2:**

**Ans: Chromatography:**

* A technique for the separation of a mixture by passing it in solution or suspension through a medium in which the components move at different rates.

***Phases of chromatography:***

1. **Stationary phase:**

Stationary phase is a porous solid (e.g. glass, silica) that is packed into a glass or metal tube or that constitutes the walls of an open-tube capillary.

1. **Mobile phase:**

Mobile phase carries the components of the mixture through the medium being used.

**Q3:**

**Ans:** flame photometry used in determination of calcium and magnesium in cement.

* Used in the study of equilibrium constants involving in ion exchange resins.
* To estimate sodium, potassium, calcium, lithium, level in sample of cerum and other body fluids.
* Useful for the determination of alkali and alkaline earth metals.

**Q4:**

**Ans: Centrifuge:**

* A machine with a rapidly rotating container that applies centrifugal force to its contents, typically to separate fluids of different densities like liquid from solid.

**Discovery:**

Antonin Prandtl proposed the idea of centrifuge in 1864.

**Components:**

1. **Rotors:**

These are the rotating unit of the centrifuge which has fixed holes drilled at an angle test tubes are placed inside these holes and rotor spins to aid in the separation of the material.

***🡺Types of rotors:***

1. Swing-bucket
2. Fixed-angle
3. Vertical rotors
4. **Driveshaft:**

Comprising a flexible shaft surrounded by a sheath. The other end of the flexible shaft extends beyond the other end of the sheath and carries a head which is appointed to receive the rotor of the centrifuge.

1. **Chamber:**

The entire system is housed within a chamber

1. **Compressor:**

If the centrifuge is refrigerated the compressor is also included.

1. **Sample**
2. **Control**
3. **Lid**

**Q5: Write note on water bath?**

**Ans: Water bath:**

* A water bath is a laboratory equipment made from container filled with heated water used to incubate sample’s in water at a constant temperature over a long period of time.
* Temperature may be controlled digitally or by a dial and once set
* Capacity of water bath is from 2 liters to 28 liters.
* Used in laboratory for performing different tests like, coagulation tests, blood buking, thawing FFP, incubate bottles of culture.

**🡺Components:**

1. **Trough:**

Insulated metal usually stainless steel or of heat resistance glass, with without, an insulated lid.

1. **Electronic element:**

Used to heat the water contained in the trough

1. **Propeller:**

Used to circulate the water in the trough in order to maintain a uniform temperature throughout the trough.

1. **Thermometer:**

Used to check the temperature.

1. **Thermostat:**

Used to maintain the temperature at a constant level.

**🡺Operation:**

1. Fill the trough with clean with distilled water to a desired level and then switch on the machine.
2. Set the thermostat to desired temperature and allow-the water to warm to that temperature.
3. Check the temperature from the thermometer.
4. Place the containers that are to be warmed or incubated in the trough.

**Q6:**

**Ans: Types of centrifuge:**

1. **Small/Desktop/Low speed centrifuge:**
* With or without refrigeration-slow speed (up to 4000RPM)
* Common in clinical lab.
* Can take up to 100 tubes.
1. **High speed centrifuge:**
* 15,000-20,000 RPM
* Centrifugal field of 100,000g
* Normally refrigerated
* Research applications
* Used for differential separation of nucleus, mitochondria, cellular debris etc.

1. **Ultracentrifuges:**
* 65,000 RPM (100,000’s x g)
* Very expensive
* Require special rotor
* Care in use-balance critical
* The high speed used in such devices generate considerable amount of heat
* Therefore, cooling arrangement and vacuum are required in ultracentrifuge.