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COURSE TITLE: BIOMEDICAL ENGINEERING**
**ASSIGNMENT TITLE: BIOMEDICAL EQUIPMENTS**
**Question**
1. Discuss the physics of the light microscope diagrams and illustrations needed
2. Write notes on the ff biomedical equipment. Add notes on principle, brand, care and maintainance and cost A. Centrifuge B. Automatic Tissues processor C. Microtome

1. **Compound Light Microscope Diagram**

The light microscope uses light for illumination. Some compound microscopes make use of natural light, whereas others have an illuminator attached to the base. The specimen is placed on the stage and observed through different lenses of the microscope, which have varying magnification powers.

**Light Microscope Parts and Functions**

Body Tube – It is the part of the microscope that holds the eyepiece.

Arm – The arm connects the body tube to the base. The user must hold this part in order to move the microscope from one place to another.

Base – As the name suggests, the base is the lowest portion on which the whole structure of the microscope rests.

Eyepiece – It is through the eyepiece that we look at the specimen placed on the stage of the microscope. It contains two or more lenses. The most common magnification for the eyepiece is of 10x, however, they can also be of 2x and 5x. An eyepiece is a removable part that can be interchanged with another one of a different magnification.

Objective Lenses – A standard compound microscope contains two primary objective lenses, which can have a magnification of 4x, 5x, 10x, 20x, 40x, 50x, and 100x. The magnification values are written on the side of each lens. The objective turret to which these lenses are attached, can be manually rotated to get the lens to give the desired magnification and focus of the specimen.

Stage – is the platform below the objective lens on which the object or specimen to be viewed is placed. There is a hole in the stage through which light beam passes and illuminates the specimen that is to be viewed.

Stage Clips – There are two stage clips, one on each side of the stage. Once the slide containing the specimen is placed on the stage, the stage clips are used to hold the slide in place.

Diaphragm – is located on the lower surface of the stage. It is used to control the amount of light that reaches the specimen through the hole in the stage.

Illuminator – Simple compound microscopes have a mirror that can be moved to adjust the amount of light that is focused on the specimen. However, some advanced types of compound microscopes have their own light source.

The Adjustments – There are two adjustment knobs, the fine adjustment knob and the coarse adjustment knob. The coarse adjustment knob helps in improving the focus at a low power, whereas the fine adjustment knob helps in adjusting the focus of the lenses with higher magnification.

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1. **Principle of Centrifuge**

A centrifuge is a piece of equipment that puts an object in rotation around a fixed axis (spins it in a circle), applying a force perpendicular to the axis of spin (outward) that can be very strong. The centrifuge works using the sedimentation principle, where the centrifugal acceleration causes denser substances and particles to move outward in the radial direction. At the same time, objects that are less dense are displaced and move to the center. In a laboratory centrifuge that uses sample tubes, the radial acceleration causes denser particles to settle to the bottom of the tube, while low-density substances rise to the top.

**Brand**There are different brands of the centrifuge, namely
Eppendorf laboratory centrifuges.

OHAUS laboratory scales.

IKA laboratory shakers.

Eppendorf laboratory shakers.

VWR laboratory shakers.

**Maintenance and care of centrifuge**

There are several important cleaning and safety procedures that should be used to ensure a centrifuge works properly. First, you should clean your centrifuge daily. This includes cleaning both the exterior and the interior of the centrifuge. A sponge, warm water, and a mild detergent can be used to clean the centrifuge. Do not use caustic detergents or a product that contains chlorine ions. A plastic scrub brush should be used to avoid damaging the coatings. When you are finished cleaning the centrifuge you should use a centrifuge lubricant to lubricate the bucket grooves and rubber seals. You should also use approved disinfectants and/or “spill” kits to disinfect the centrifuge on a regular basis. In addition to cleaning the centrifuge, you should also check for residue and corrosion on the rotors on a weekly or monthly basis.
 **Cost of Centrifuge**

The average cost of a centrifuge is between $500-$1000

**Principle of Microtome**microtome is a sectioning instrument that allows the cutting of extremely thin slices of a material known as section . microtome are used in microscopy , allowing for the preparation of sample for observation under transmitted light or electrons radiation

**Brands of Microtome**

DiaPath Galileo Automatic Microtome.

Cuttec S Sliding Microtome.

DiaPath Galileo Semi-Automatic Microtome.

Tanner Scientific TN6000 Manual Precision Microtome.

Refurbished Leica RM2255 Automatic Microtome.

Microm HM355S Automatic Microtome – Refurbished.

Microm HM 325 Microtome – Refurbished.

**Care and Maintenance of the Microtome**

The **microtome** knife has been coated with an oil mixture to prevent rust and corrosion when not in use. Use a dry, lint-free, facial tissue to wipe your knife clean. Do not gauze or any other coarse material; it will destroy the edge of your knife.

**Cost**The price of the microtome ranges from 2500-5000 United states dollars.
 **Principle of the automatic tissues processor**
The tissue basket oscillates up and down in each station at three-second intervals to ensure thorough and even mixing of the reagents and optimum tissue infiltration. Infiltration time is separately programmable for each station.

**Brands**Leica tissue processors.
Milestone tissue processors.
Leica sample preparation systems.
Milestone sample preparation systems.
Bio-Optica sample preparation systems.
Roche sample preparation systems.
Thermo Scientific laboratory shakers.

 **Cost**The average price of the Tissue processor is about $5000