**Madam Pashmina**

**Subject: Fundamental of microbiology lab**

Select any one topic related to fundamental of microbiology write two pages information related to this topic

Types of Microbes

Bacteria : are small, single-celled organisms that occur in almost any natural environment. Common bacteria are too small to be seen individually without the aid of a microscope. Bacteria can multiply to form groups or colonies on a food source. After a sufficient number of replication cycles a colony of bacteria can be seen with the naked eye. Viewed under a microscope, different kinds of bacteria will have different shapes or forms. Many bacteria have either a spherical shape or an elongated rod shape. A spherical shaped bacterium (singular) is called a coccus, and a group of sphericalshaped bacteria (plural) are called cocci. A rod shaped bacterium is called a bacillus, and a group of rod-shaped bacteria are called bacilli. Some species of bacteria appear as individual cells microscopically. Other bacterial species may combine to form pairs (e.g., diplococci), groups of four (tetrads), grape-like clusters (e.g., staphylococci), and chains (e.g., streptococci or streptobacilli). Many bacteria have projections from their cell walls called fimbriae (or attachment pili). These structures assist those bacteria in attaching to one another as well as to other surfaces. Some types of bacteria possess flagella that allow those bacteria to be motile. Certain bacteria (e.g., Clostridia spp.) have the capacity to sporulate or form spores (also called endospores). Simply put, a spore-forming bacterium encapsulates its vital structures in a tough outer coat when environmental conditions become harsh. Spores are resistant to heat, chemicals, and other environmental conditions. Bacterial spores are unable to reproduce; however, once conditions again become favorable for growth the spores reactivate and become vegetative (reproducing) cells again. Some bacteria can produce toxins that in sufficient doses cause foodborne illness (e.g., botulism). Toxins can be produced by spore-forming bacteria, but only in the vegetative state. Suppressing reactivation to the vegetative state, then, is important in ensuring food safety in many processes. Some non-spore forming bacteria, like Staphylococcus aureus, can also produce toxins.

Fungi : The fungi consist of two major groups of microbes, molds and yeasts. Molds are multicellular organisms. Yeasts are single-celled organisms. Molds and yeasts tend to be significantly larger than bacteria. Both molds and yeasts are widely distributed in nature, both in the soil and in dust carried by air. Molds have a branching filamentous structure, and can develop into colonies visible as a colorful, furry or downy coating on food or surfaces. They reproduce by producing small spores, which are not related to bacterial spores mentioned above. Mold spores can be picked up and spread by air currents. If mold spores settle on suitable surfaces, they will begin to germinate and produce new mold growth. Yeasts are usually egg-shaped, and tend to be smaller than molds. Like molds, yeasts can be spread via air currents. They reproduce by a process known as budding. Visible colonies of yeast are generally slimy in appearance and creamy white.

Parasites

Parasites are living organisms that derive nourishment and protection from other living organisms called hosts. These organisms live and reproduce within the tissues and organs of infected human and animal hosts. There are different types of parasites, and they range in size from single-celled protozoa to multi-cellular worms. Protozoan parasites are visible only through a microscope. Many adult parasitic worms are visible without a microscope; however, a microscope is necessary for detecting eggs and preadult forms of some worms. Identification of the adult forms of certain parasitic worms can also require microscopy. The respective lifecycle of different parasites also varies. While some parasites use a permanent host, others go through a series of developmental phases using different animals or human hosts. They may be transmitted from host to host through consumption of contaminated food and water. Several parasites have emerged as significant causes of foodborne and waterborne illness.

Viruses Viruses are much smaller than bacteria. They are too small to be seen with a standard light microscope. An electron microscope is necessary to see viruses. These microbes are not true living organisms. They are composed of genetic material—either deoxyribonucleic acid (DNA) or ribonucleic acid (RNA)—enclosed in a protein coat. A virus must invade a living host cell in order to replicate. Once inside the host cell, the viral genetic material directs the host cell’s “machinery” to make more virus particles, which interferes with normal host cell function and may result in destruction of the host cell.