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OBJECTIVES

FROM MID PORTION

1. Peripheral proteins_____ **Loosely Connected and Soluble in Water**
2. Plasmid _____ **Extrachromosomal Circular DNA**
3. **M**esophiles optimum temp is _____**37**
4. Extreme halophiles require high salt concentration _____**30%**
5. pH of mold is _____ **5 - 6**
6. Which do not grow in the presence of 02 _____**Obligate Anaerobes**
7. The process in hot air sterilization is_____ **Oxidation**
8. Which is not a method of direct count. _____ **Spectrophotometer**
9. Resolution of microscope is_____ **0.2um**
10. Cell wall is absent in_____ **Mycoplasma**
11. Ribosomes made up of _____**mRNA And Protein**
12. Rings of basal body of gram negatives _____**4**
13. Gram negative appears on stain _____**Colorless**
14. Basic dye methylene_____ **Blue**
15. Rat bite fever caused by_____ **Spirillum Minus**
16. High salt concentration used by obligate halophiles_____ **30%**
17. Acellular organisms_____ **Viruses**
18. Robert Hooke draws of microbes in_____ **1665.**
19. Direct count method _____ **Membrane Filter**
20. Standard condition for hot air oven_____**170*C For 2hours**
21. Autoclaving at_____**121*C 15psi 120min**
22. ETO do not use_____**1500mg/ml**
23. Example of biguanides is_____ **Chlorohexidine**
24. Bacteriophage is _____**Virus Infecting Bacteria**
25. Plasmid is _____ **Double**
26. Proteins are separated by_____ **Gel Electrophoresis**
27. Structural support is provided by _____**Core Polysaccharides**
28. Alpha hemolysis gives_____ **Greenish Halo Color**
29. 30S ribosome contain_____ **2rRNA**



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30. Alcohol is more effective_____ **70 %**
31. Studying microbes is_____ **Microbiology**
32. Monitoring diseases in a population_____ **Epidemiology**
33. Specimen or sample is placed on _____ **Stage**
34. _____ Transfer DNA from one bacterium to other **Pilli Transfer DNA From One Bacterium** to other
35. Half of the dry weight of microbe is_____ **Carbon**
36. Water molecules pass through _____ **Aquaporins**
37. Lyme disease is caused by. _____ **Borrelia Burgdorferi**
38. Which of the following is not bacterial gene transfer method? _____ **Transfection**
39. Which One is correct answer regarding sterilization __ **Removal of Microbes and Their Spores**
40. Ethylene oxide is strongly Strong alkylating agent that kills by reacting with functional groups of------ and proteins to block replication and enzymatic activity_____ **DNA**
41. Is Transfer of DNA by a virus called bacteriophages. _____ **Transduction**
42. Transformation of horizontal gene transfer between two____ **Bacteria**
43. Primary stain of gram method is_____ **Crystal Violet**
44. Antigen antibody reactions is a _____ method of microbial identification. _____ **Serological**
45. Phenol and Phenolic widely used antiseptics Disruption of _____ **Plasma Membranes**
46. Buffers are used to maintain desired_____ **PH**
47. Halogens Iodine and chlorine Inhibit protein_____ **Function**
48. Vaccine of small pox_____ **Edward Jenner**
49. Hot air sterilized by _____ **Oxidation**
50. F means _____ **Fertility Factor**
51. Bacteriophage is a _____ **Virus**
52. The study of the evolutionary history of organism's_____ **Systematics/Phylogeny**
53. Prokaryotes are divided by_____ **Mitosis**
54. Optimum growth of Psychrophiles at_____ **15 Degree Centigrade**
55. Asepsis_____ **Absence of Significant Contamination**
56. All are used for indirect microbial count except_____ **Flow Cytometer**
57. All the terms are used to represent the form of colonies except_____ **Convex**
58. Virusoids has no_ _____ **ssDNA**
59. Tetracycline ---------- broad spectrum. _____ **Wide**
60. Food in refrigerator is spoiled by_____ **Psychograph**

61. Antibodies have 2heavy and ----light chain_____ **2**

62. Thickness of capsule depends upon_____ **Culture Condition**

63. "Motile, unicellular organism" these characteristics related to which of the following_____ **Protozoa**

64. Antibiotics resistant genes can be transferred through_____ **Specialized Transduction**

65. The Range of _____UV is most bactericidal_____ **200-280**

66. PCR is the------ methods for the identification of microbes_____ **Molecular**

LECTURES 53 to 65

67. Unicellular fungi IS _____ **Yeast**

68. Asexual spores are formed by _____ **Mitosis**

69. Mycobiont is_____ **Fungi**

70. ELISA is used for _____ **Antigen and Antibody**

71. Eastern blotting is used for_____ **Proteins**

72. Which is not belong to ELISA _____ **Probe**

73. Study of fungi_____ **Mycology**

74. Persistent infection _____ **Viruses Replicate Slowly**

75. Algal body is _____ **Thallus**

76. The made of action of chemicals to control micro-organism 1s the. _____ **Phenol and Phenolic**

77. Fungi get CO2 from____ **Organic Matter**

78. Patient returns to normal IN_____ **Convalescent Period**

79. Viruses may have envelope outside _____ **Virion**

80. Spores formed by rounding and enlargement within a hyphal segment _____ **Chlamydoconidium**

81. Staining of fungi done by_____ **Lactophenol Cotton Blue**

LECTURES 66 to 80

82. Consistently present but with low incidence_____ **Endemic**

83. Which is not belong to innate immunity. _____ **Specific**

84. Which is not lymphocyte _____ **Monocytes**

85. Virus replicates _____ **Slowly**

86. Sight of entry through which microorganism enter body. _____ **Portals of Entry**

87. Infectious circular RNA of plants_____ **Viroid**

88. Sight of entry through which micro-organism gain access to the body __ **Mucous Membrane**

89. Not true for virusoids _____ **ds Circular DNA**

90. Infectious dose 50% (ID50) _____ **TCID**

91. Microbiota _____**Nutrients**

92. Algae produced ----O2_____**80%**

93. Kuru in humans IS caused by_____ **Prions**

94. route of entry effects_____**ID50**

95. Lactoferrin is iron containing protein present in_____ **Blood**

96. The Bursa is an epithelial and lymphoid organ that is found only in_____ **Amphibian**

97. Staining of fungi is done by using_____ **Lactophenol Cotton Blue**

98. Rabies virus is the example of_____ **Helical Viruses**

LECTURES 81 to 95

99. Mycobacterium is stained by _____**Acid Fast Staining**

100. Endospores are stain with _____**Malachite Green**

101. Type-II hypersensitivity -----is involved? _____ **IgG or IgM**

102. Ziehl Nielsen method is commonly used_____ **Acid Fast Technique**

103. which antibodies involve in type-I hypersensitivity or anaphylaxis_____ **IgG**

104. blood transfusion reaction is the example of _____ **Hypersensitivity-II**

105. ------tannic acid is produced in mordant_____**10%**

106. 10% tannic acid is used as----during flagella staining _____**Mordant**

107. Corticosteroid is use in_____ **Hypersensitivity-III**

108. Each B cell has unique antibody molecules against ---epitope only _____ **One**

109. Mast cells degranulate and secretes mediators of inflammation. _____ **Histamine, Leukotrienes, PG**

110. Primary immune response produces mainly___ ___ **Antibodies.**

LECTURES 96 to 104

111. Spectrum of Drugs _____**Tetracycline**

112. responsible for Irish potato blight_____ **Phytophthora Infectants**

113. Metronidazole is used for _____ **Giardiasis, Amebiasis, Trichomoniasis (All)**

114. Penicillin attack _____ **Cell Wall**

115. Isoniazid is used as commonly_____ **Tuberculosis**

116. Quinolones and Rifampin are antibodies that inhibit _____**DNA Replication**

SUBJECTIVES

Lectures 53 to 65

1. Karyogamy Plasmogamy And Meiosis?

Plasmogamy:

A haploid nucleus of a donor cell (+) penetrates the cytoplasm of a recipient cell (-) Both cells are haploid (one set of chromosomes).

Karyogamy:

The (+) and (-) nuclei fuse to form a diploid zygote nucleus.

Meiosis:

The diploid nucleus gives rise to haploid nuclei (sexual spores).

2. Vegetative Hyphae and Aerial Hyphae

Vegetative Hyphae:

Hyphae that are embedded in the medium and are used to obtain food are called vegetative hypha.

Aerial or Reproductive Hyphae:

The portion of hyphae that is concerned with reproduction. This portion is projected into the air. They bear reproductive spores.

3. Algae Structure

Body of multicellular alga such as seaweed is called a thallus which consists of branched holdfasts (anchor alga to rock) stemlike hollow stipes and leaflike blades. There is no vascular tissue in these algae. Surrounding water provides the support for the thallus. Some algae have a

gas filled body inside them which keeps them floating in the water. This gas filled structure is called pneumatocyst or float

4. Economies Use of Fungi?

Saccharomyces is used for alcoholic beverages under anaerobic conditions and if incubated aerobically, it is used in bread making because it metabolizes glucose to produce CO,

They play an important role in medicine yielding antibiotics,

- In agriculture by maintaining the fertility of the soil and causing crop and fruit diseases,
- Forming basis of many industries and as important means of food.
- Yeast is also extensively used for molecular biology work and vaccine production.
- Entomophaga (kills gypsy moth), hence is used as a biological pest control.
- Mushrooms can be cooked and eaten as a source of proteins for humans.

5. Process of Bacterial Identification?

The identification of bacteria 1s a careful and systematic process that uses many different techniques to narrow down the types of bacteria that are present in an unknown bacterial culture. It produces benefits for many aspects of the research of microorganisms and helps physicians correctly treat patients.

6. What Is Western Blotting?

Western Blotting:

We can use this technique for the detection of antigen in the serum. Microbial protems can be separated on SDS-PAGE by electrophoresis and the presence of these proteins can be detected by enzyme-tagged antibodies specific to those proteins. A color band will be seen where the specific protein (antigen) 1s present on the gel. Please remember that proteins in the gel are first transferred to a paper strip before they could be detected by specific antibodies

7. Explain Types of Conidiophores?

- **Conidia:** Chain of spores at the end of a conidiophore e.g. Aspergillus
- **Arthroconidia:** spores formed by fragmentation of septate hypha e.g. Coccidioides immitus
- **Blastoconidia:** spores as budding of the parent cells e.g. Candida albicans
- **Chlamydioconidia:** spores formed by rounding and enlargement within a hyphal segment **e.g** Candida albicans

8. Define and Types of Algae.

The definition of algae is a single or multi-cellular organism that has no roots, stems or leaves and is often found in water These are simple eukaryotic cells. Some are unicellular, others are multicellular.

Phaeophyta (Kelp):

Commonly known as brown algae, brownish in color, contains cellulose and alginic acid cell walls, are multicellular and contain chlorophyll a and c, xanthophylls. These store carbohydrates and are used for algin. Can grow upto 20 cm in one day.

Rhodophyta:

Red Alage, these are reddish in color and contain cellulose in their cell walls. Most are multicellular and contain chlorophyll a and d.They store glucose polymer and used for agar.

Chlorophyta:

Green Algae: have all the features of red algae except that chlorophyll is of a and b types only. They are Unicellular or multicellular. These algae are believed to have given rise to terrestrial plants.

Bacillariophyta:

Brownish in color, Cell wall is composed of pectin and silica. They are unicellular and possess chlorophyll a and c, and carotene xanthophylls. These algae store oil and produce domoic acid.

Dinoflagellates:

These are unicellular algae collectively called as plankton (free floating organisms). These cells have cellulose in their cytoplasmic membrane which gives the membrane rigidity. They have chlorophyll a and c, and carotene. These algae store starch in them.

9. Capsomere

- ⇒ Capsid is made up of protein subunits called capsomeres
- ⇒ capsomere subunit proteins can be single type or multiple types
- ⇒ Arrangement of capsomeres is characteristic of a particular type of virus

10.`Basic Features of Yeast

- Non-filamentous fungi
- Unicellular

- Reproduce by budding (asexually) or sexually
- Some are dimorphic ¢ Larger than bacteria
- No flagella or cilia
- Facultative anaerobes
- Gram positive

11.Features of Algae?

- these are Simple eukaryotic cells
- Some are unicellular, others are multicellular
- Lack tissues seen in plants Absorb nutrients from water through their surfaces
- Mostly photoautotrophs, a few are chemoheterotroph
- Mostly aquatic (water is necessary for physical support, reproduction and diffusion of nutrients)
- Cell covering thallus can carry photosynthesis
- Some algae float by gas-filled bladders
- Their location in oceans depends on the availability of nutrients, wavelength of light and the surface on which to grow.
- Body of multicellular alga is called a thallus which consists of branched holdfasts (anchor alga to rock) stemlike hollow stipes and leaflike blades

12.What Are The 2 Benefits Algae Get from Oceans?

- Algae are important for aquatic life. They are at the bottom of the food chain because they fix CO2 into organic molecules (Carbs) which could be used by other organisms.
- They produce 80% of molecular oxygen on earth.
- Algal blooms tell us about the status of pollution in the environment.

13.Lichens

- Combination of green alga or a cyanobacterium and a fungus
- Both partners have Symbiotic relationship with each other
- Partners do not grow alone
- Grow where no other microbes can grow

Lectures 66 to 80

14.What Is Plaque?

Plaques are equivalent to bacterial colonies. Basically, a plaque is an area where the virus infection has lysed the cells. These plaques are formed on cultured cells in a culture dish. Plaques can be counted easily much like bacterial colonies

15.Immune and Its Types? Define Immunity and Its Types?

Innate and Adaptive Immunity Or

Difference Between Innate and Adaptive Immunity

Immunity:

Ability of the body to protect itself from harmful effects of diseases.

Two types

- **Innate Immunity**
- **Adaptive immunity**

Innate Immunity

Plants and animals have what is called mnate immunity. Innate immunity is the first line of defense against pathogens. It involves several cell types, proteins, and even an organ. The organ involved is your skin. Yes, skin is part of the first line of defense. It protects you and prevents pathogens from getting inside your body.

Adaptive immunity

Adaptive immunity is an important part of the immune system. It is protection from an infectious disease agent that is mediated by B- and T- lymphocytes following exposure to specific antigen, and characterized by immunological memory.

16.Virulence?

The extent of pathogenicity is called virulence of a pathogen.

17.Epidemiology and Its Type?

The study of where and when diseases occur and how they are transmitted in a population. There are three basic types of investigations relating to epidemiology

⇒ Descriptive Epidemiology
⇒ Analytical Epidemiology
⇒ Experimental Epidemiology

18.Epidemiology and Methods?

The study of where and when diseases occur and how they are transmitted in a population

Descriptive Epidemiology:

It includes location and time of cases of disease, gender, health, age of patients etc. (Basically, frequency and distribution of risk factors in population are recorded).

Analytical Epidemiology:

It relates to determining the cause of the disease. Analysis of data, mode of transmission of diseases and means to prevent diseases also come in this discipline. Such studies can be done with case control methods in which factors that have preceded the disease are determined.

Experimental Epidemiology:

A hypothesis relating to a disease is tested in this approach. For example, smoking cause cancer can be tested by designing an experiment in mice in which they are exposed to certain levels of smoke over time and then the outcome is observed. Another example will be testing of a drug for prevention of a disease.

19.What Is Zoonosis?

Primarily an animal infection, but can be transmitted to humans. It can assume epidemic proportions in humans and is difficult to control or eradicate.

20.What Are Interferons? Give Their Function.

Interferons are antiviral proteins, produced by macrophages and lymphocytes in response to viral infections. Fibroblasts can also secrete it. These proteins interfere with viral replication.

There are two types of interferons:

Species Specific:

This means that interferon produced by humans cannot be used in dogs or cats or vice versa.

Not Viral Specific:

This means that interferons produced in response to virus A can also be effective against virus B.

21.Type of T Cell T Helper Cells?

TH1 (CD4+)

TH2 (CD4+)

T cytotoxic cells (CD8+)

22.Microbiota Factor And Distribution Composition

Availability of various nutrients determines the type of organisms present in a system. Similarly, physical and chemical factors also influence the type of microbiota. Other factors include pH, O2, and CO2.

Capsule Function?

The capsule impairs phagocytosis and help the organisms evade the immune system; however, antibodies can help cells of the immune system in phagocytosis of such encapsulated organisms. Only a few bacteria produce capsule which include Strep pneumonia, Klebsiella pneumonia.

23.Types of Symbiosis?

Interaction between two different organisms living in close physical association is called symbiosis.

Mutualism:

Both are benefited Parasitism: one is harmed.

Commensalism:

One is benefited, other is unharmed. Parasitism: one is harmed

24.Inflammation and Write Its Consequence?

Inflammation

Damage to body tissues triggers a local defensive response which is called inflammation. It causes:

- Redness
- Pain
- Swelling
- Heat

During inflammation, various mediators of inflammation are released, some of which include:

⇒ Histamine
⇒ Kinins

⇒ Prostaglandins by damaged cells
⇒ Leukotrienes by mast cells
⇒ Cytokines are released (TNF-alpha) o Cause's release of acute phase proteins from liver.

25.Cytokines

Cytokines are released as a result of defense cell stimulation by PAMPs and TLRs interactions. Cytokines recruits more immune cells and also stimulate adaptive immune response

26.Incidence and Prevalence

Incidence: # of new cases in a given time period in a population. Prevalence: New + existing cases

27.Hypersensitivity Type 3

- This hypersensitivity involves soluble antigen circulating in the serum and antibodies. Complement gets activated when these complexes get deposited in capillary beds as we see in the kidneys.
- A typical example will be the use of antibodies that was prepared in horses but given to a human to save the life. What happens is that horse antibodies will be recognized by human body as a foreign protein and human immune system will generate antibodies against this.
- This type of hypersensitivity can be diagnosed by history and symptoms.
- Glomerulonephritis is very common.
- Deposition of immune complexes in the kidneys can be diagnosed by presence of IgG in kidney cells by using anti-IgG antibodies.

LECTURES 81 to 95

28.Bactericidal and Bacteriostatic Drug

Bactericidal:

Those antibiotics that kill and lyse the cells are called bactericidal

Bacteriostatic:

Such antibiotics stop the growth of the organisms, they do not kill or lyse the cells. Cells of the immune system then clear them from the body

29.Distribution of MHC1 AND MHCII?

MHC I:

Present on all nucleated cells

MHC II:

Present only on APCs

30.Difference Between Capsule and Slime?

Capsule:

- If glycocalyx is organized and firmly attached to the cell, it is called a capsule.
- Plays important role in virulence (degree of pathogenicity
- Can be demonstrated by negative staining technique.

Slime:

If glycocalyx is loosely attached to the cell, it is called slime.

31.Role of Thin Clonal Selection?

According to this theory, B cells are generated in the bone marrow randomly without seeing the antigen. When such a B cell encounters its specific antigen in the body and start secreting antibodies. A beautiful example to understand clonal selection theory is like going to a shoe store and select a shoe size that fits you very well. Note, that the shoe that you selected was made randomly without any regard to your foot size.

32.Antifungal Drugs.

⇒ Polyenes
⇒ Amphotericin B
⇒ Li Used for systemic infections
⇒ Azoles (inhibits synthesis of PM)

33.How Adoptive Immunity Was Discovered?

Observation: Individual one recovered from smallpox, measles or chicken pox immune to it. Experiments led to antibodies recovery in serum and vaccination.

34.Antigen Presenting Cell

These cells are able to present antigens to B cells for making antibodies by B cells. There are three cells that fall into this category: Dendritic cells, macrophages, and B cells

35.Name the Antigen Presenting Cell?

- Dendritic cell
- Macrophages
- B cell

36.How Disease Can Be Transmitted?

Direct Transmission:

Person to person physical contact is a direct contact. Influenza spread is a typical example.

Indirect Transmission:

A nonliving object is involved. Objects in the use of a patient such as handkerchief, utensils, pillow and bedding are called fomites. These can transmit organisms to susceptible individuals.

Droplet Transmission:

Mucus droplets are created when you sneeze for example. These droplets carry organisms that may infect another individual who comes in contact with the droplets. One sneeze may produce 20,000 droplets. Influenza can be spread by this route.

Vehicle Transmission:

Transmission of disease agents by a medium, such as water, food, or air. Other media include blood and other body fluids, drugs, and intravenous fluids:

Mechanical Transmission:

In this type of transmission, organisms stick to the body parts of insects and get transmitted passively from one location to another.

Biological Transmission:

Microbes multiply in the insect and is transmitted actively by insect bites from one individual to another

37.Viral Replication and Its Mechanism? Stages of Viral Replication?

Viral replication involves six steps:

⇒ Attachment,
⇒ Penetration,
⇒ Uncoating,

⇒ Replication,
⇒ Assembly,
⇒ Release.

During uncoating, replication, and assembly, the viral DNA or RNA incorporates itself into the host cell's genetic material and induces it to replicate the viral genome.

38.Difference LB Broth and LB Agar?

LB Broth:

LB broth (LB) 1s a nutritionally rich medium primarily used for the growth of bacteria. Its creator, Giuseppe Bertani, intended LB to stand for lysogeny broth, but LB has also come to be commonly referred to as Luria broth, Lennox broth, or Luria-Bertani medium.

LB Agar:

Luria broth (LB) is a nutrient-rich media commonly used to culture bacteria in the lab. The addition of agar to LB results in the formation of a gel that bacteria can grow on, as they are unable to digest the agar but can gather nutrition from the LB within.

39.Explain ELISA.

There are some interactions (Antigens and Antibodies) that are not directly evident. Interactions may have taken place, but there is no visible direct clue if the interaction has taken place or not. For such interactions, we use indirect methods.

Enzyme-Linked Immunosorbent Assay:

This test is done by coating the ELISA plastic plates either with the antigen or the antibodies. Suppose we have Brucella antigen coated ELISA plates that can detect antibodies from the serum of a Brucella infected animal. You take the serum and put into the wells of ELISA plate. You allow time for antigen and antibody to interact and then wash these wells with some buffer to remove unbound antibodies. These bound antibodies are not visible at this step. So, how do we see this interaction? Well, we use another antibody that has been made against the antibody bound to the antigen. This special antibody has been tagged with an enzyme. After allowing time for interaction of this 2ndantibody with the 1stantibody, 2naantibody is also given a washing to remove unbound antibody molecules. Again, we cannot say if interaction has taken place or not. Here comes an indirect way of detecting this interaction.

40.Hypersensitivity and Its Type?

It is a normal Immune response but in a damaging way. In other words, immune system is acting in a way for which it has made to. So, when an antigen gets into the body, immune system recognizes it as foreign and start making antibodies against the antigen.

Allergy is another name for hypersensitivity. Those antigens that act in a bad way are called allergens

Types of Hypersensitivity:

Hypersensitivities can be grouped into 4 types based on the types of antibodies or cells involved.

- **Type I (Anaphylactic):** Also called anaphylaxis or immediate hypersensitivity. This is IgE mediated. Happens in <30 mints.
- **Type II (Cytotoxic):** IgG and IgM mediated as these antibodies attach to cells and destroy them by activating complement.
- **Type III (Immune complex mediated):** Immune complexes are formed by IgM or IgG antibodies and these complexes lodge in the capillary beds and cause damage by complement activation.
- **Type IV (delayed type cell-mediated):** CD4+ helper cells along with macrophages are involved.

41.Define Antigen and Epitope

Antigen:

A foreign substance that provokes immunity is called an antigen. The definition of antigen is a harmful substance which enters the body which causes the body to make antibodies as a response to fight off disease. More specifically called as an immunogen.

Proteins are best antigen, though glycoproteins and lipoproteins can also act as antigens. Carbohydrates and lipid alone are poor antigens.

Epitopes:

Specific regions on an antigen. In other words, any antigen has multiple regions each one of those acts as a small antigen. These are called epitopes. These epitopes are also called as antigenic determinants. o Most antigens have MW >10,000 D. Molecules that are less than 10,000 D are generally poor antigen.

42.Agglutination and Neutralization

Agglutination:

Antibodies can agglutinate antigens which are then cleared as a group by macrophages

Neutralization:

Toxins bind with antibodies and they become incapable of binding to their target receptors thus the toxins become harmless

43.Viral Replication Stages

Viral multiplication goes through various stages in the cell. These include viral attachment, entry into the cell by pinocytosis or fusion with the plasma membrane, uncoating of the virus, biosynthesis of capsids and nucleic acids, maturation (assembly of the virus) and final release of the virus from the cell.

44.Cause and Diagnose of Anaphylaxis?

The patient also experiences difficulty in breathing. It is an emergency as it may kill the person. Anaphylaxis may be local or systemic.

Shock from drug reactions, venoms, and common allergens causing asthma are some examples of type I hypersensitivity.

Diagnosed

Diagnosed by demonstration of IgE by intradermal injections of allergens one by one. If specific IgE are present in the serum, a reaction will be visible on the skin locally in the form of a wheel of inflammation.

45.Acid Fast Stanning

Some bacteria such as Mycobacteria have a waxy material in their cell wall. Specific name for this waxy substance is mycolic acid

Principle of Acid-Fast Staining:

Mycobacteria are lipophilic, not easy to stain but once stained, they are resistant to acidic alcohol decolorization process.

Procedure for Acid-Fast Staining:

- Make a smear
- Carbolfuchsin on slides
- Heat the slide for 5-10 min

- Wash with water and then with acid alcohol for 1 min.
- Counterstain with methylene blue for 1 min
- See under the microscope.
- Acid fast bacteria have mycolic acid that can be stained by heating the organisms with the stain.

46.Capsule Staining

Capsule:

- ⇒ if glycocalyx is organized and firmly attached to the cell, it is called a capsule.
- ⇒ Plays important role in virulence (degree of pathogenicity)
- ⇒ Can also be a part of the vaccine against the bacteria to which it belongs.
- ⇒ Can be demonstrated by negative staining technique.
- ⇒ Thickness of the capsule depends upon the culture conditions.
- ⇒ Capsules are mostly are water soluble.

Capsule Staining Procedure:

- Prepare a thick smear in a loopful of congo red (1%) stain
- Fixation in acid alcohol for 15 sec
- Wash with dH2O
- Cover it with acid fuchsin for 1 min.
- Wash with water ➢ Bacteria stains red
- Capsule colorless
- Dark blue background Capsule can be seen with staining. Helps in identifying organisms.

47.Treatment of Hypersensitivity Ii

- Avoid those drugs that cause it.
- Blood transfusion with correct blood type
- Symptomatic treatment IgG or IgM involved Causes damage to the cells. Treated according to the cause.

48.Signature Sequence and Primer Signature Sequences

There are many tests that involve nucleic acid sequence detection for the presence of microbes in a clinical sample. Please remember, as antibodies are specific to the organisms, DNA or RNA sequences must be uniquely specific for the microbe that we are going to detect. Such sequences that are specific to an organism are called signature sequences

Primer: A primer is a fragment of DNA which is specific to the signature sequence Feature of yeast cells

LECTURES 96 to 104

49.Spectrum of Drugs

- **Narrow:** targets only a group of organisms – Penicillin for G+ve
- **Wide:** Targets many groups of microbes – Tetracycline
- **Narrow:** well targeted – Spare microflora
- **Wide:** Targets every organism – Destroy normal microflora as well

50.Which Drugs Inhibits the Protein Synthesis?

Several antibiotics acts on ribosomes and inhibits protein synthesis like streptomycin, tetracycline's, chloramphenicol and clindamycin

51.Describe Two Transported System in The Blood and Why It Is Necessary?

Cardiovascular and lymphatics are the two transport systems of the body by which cells of the immune system patrol the whole body.

Cardiovascular system consists of the heart and associated blood vessels (arteries and veins) in which blood circulates

Lymphatics are channels that start from tissue spaces and collect tissue fluid (called lymph) from tissue spaces and bring them back to the heart. Along these lymphatic channels, there are strategically placed lymph nodes which filter lymph for microbes much like blood is filtered in the Spleen.

Why Cardiovascular and Lymphatics Are Needed?

Well, in unicellular organisms, nutrients can be absorbed directly from the environment in which a unicellular organism is living. However, a multicellular organism does not have this easy access to the nutrients. So, nutrients must surround the cells in a multicellular organism. These nutrients are provided by cardiovascular system which pumps blood to all organs nature has provided another mechanism in the form of lymphatic channels which start from tissue spaces and can drain tissue fluid and proteins back to the heart. This is the role of blood vessels and lymphatics that they ensure circulation of nutrients throughout the body without causing any edema or abnormality. B cells and T cells also keep circulating between these two channels (cardiovascular and lymphatics).

52.Disk Diffusion Method?

A standardized inoculum of the organisms is spread on agar plate.

- Filter paper disks soaked with anti-bacterial
- Plates are incubated at 37oC and results are recorded.

The size of the zone directly relates to the degree of sensitivity of the drug. This zone is compared to a standard table for recording the results of sensitivity test. Results are reported as sensitive or resistant or intermediate

53.How Microbes Develop Resistance in Antimicrobial?

Antimicrobial resistance is accelerated when the presence of antibiotics and antifungals pressure bacteria and fungi to adapt. Antibiotics and antifungals kill some germs that cause infections, but they also kill helpful germs that protect our body from infection. The antimicrobial-resistant germs survive and multiply. (internet)

54.Inhibits Growth Cell Wall Drug Name?

Penicillin's and cephalosporins are the major antibiotics that inhibit bacterial cell wall synthesis.

55.Define Vaccine and Its Types?

Vaccine:

A product that creates immunity against an infection is called a vaccine. It could be the whole organism or a part of the organism

Types of Vaccine:

- **LIVE ATTENUATED VACCINES:** Louis Pasteur was the first to do that. These are weakened organisms so that they do not harm the body, but divide or replicate in the same way as pathogenic version of the organism does in the body. So, when a live virus or bacteria multiplies in the body, it stimulates the immune system to create an adaptive immune response which is protective against the disease for which vaccine was given.
- **INACTIVATED KILLED VACCINES:** the organism is killed with formalin or phenol and then used as a killed inactivated vaccine. Because organisms in such a vaccine do not replicate in the body, frequent boosters are required to achieve a good level of immunity. Examples are Rabies, Polio and Influenza.
- **TOXOIDS:** Toxins are inactivated and used as a vaccine. Tetanus toxoid is a good example of toxoids.

- **CONJUGATED VACCINES:** In order to enhance immunity, such poor antigens are attached to proteins, and such vaccines are called conjugated vaccines. Haemophilus influenzae type b is a good example.
- **DNA VACCINES:** We now know that sometimes only certain proteins are required for generating a good immune response. In such cases, the genes responsible for those proteins can act as vaccines. West Nile Virus is a good example of DNA vaccine.
- **SUBUNIT VACCINES:** Also called recombinant vaccines, such vaccines are composed of a portion of viral or bacterial proteins that can induce immunity. In other words, this is another version of DNA vaccine.

FROM MID PORTION

56.Give Two Advantages of Solid Media in Bacterial Culturing.

- Solidification of the medium is done for purifying organisms from each other as solid medium provides surface for individual colonies to grow well separated from each other.
- Secondly, the solid media are used to study the colony characteristics.

57.Cell Membrane Function?

- Selective permeable barrier
- Passive and Active Transport
- Respiration in microbes (bacteria)
- Photosynthesis in microbes
- Lipid synthesis

58.Two Name of Bacteria Which Is Capsulated?

Bacillus anthracic, streptococcus pneumonia and Klebsiella are examples of capsulated organism

59.Magnetosome?

- Inclusions of iron oxide
- Surrounded by invaginations of plasma membrane
- Present in G negative bacteria
- Act like a magnet. Bacteria can stick to iron containing rocks for nutrition.
- Decompose H2O2 which is toxic for cells.

60.Advantage of Dry Heat Relatively?

Advantages of dry heat sterilization include: it is inexpensive, it does not pollute or cause toxic fumes, and it does not corrode or rust metal objects.

61.How Microorganism Cause Damaged the Body?

Infection with a pathogen does not necessarily lead to disease. Infection occurs when viruses, bacteria, or other microbes enter your body and begin to multiply. ... Pathogenic microbes challenge the immune system in many ways. Viruses make us sick by killing cells or disrupting cell function.

62.Microbial Identification?

Microbial Identification can be defined as "microbial characterization by a limited spectrum of tests pre-chosen and appropriate to the problem being studied"

Methods: Classical or Conventional Method, Serological testing, Nucleic acid-based testing.

63.PCR Method S?

PCR goes through 3 step cycles for about 30 to 35 times. Each cycle consists of a denaturing stage (about 95oC), primer annealing (50 to 56oC) and extending stage (72oC

64.Gram Staining Procedure?

- ⇒ Crystal violet is added. — Primary stain
- ⇒ Crystal violet is washed off.
- ⇒ Iodine is added to enhance binding. — Mordant.
- ⇒ The slide is washed off with alcohol. — Decolorizing agent
- ⇒ Gram positive bacteria retain crystal violet
- ⇒ Gram negative bacteria appear colorless. * Crystal violet and iodine make a complex in the cytoplasm
- ⇒ Peptidoglycan layer is thicker in Gram positive bacteria and CV-I is retained.
- ⇒ Alcohol is rinsed off and stained with safranin. — Counterstain
- ⇒ The smear is washed again.
- ⇒ Blotted dry and examined microscopically.

65.Difference Simple and Differential Media?

Simple and Differential media are used to isolate or identify particular organisms.

Simple Media:

It's a general-purpose media that supports the growth of non-fastidious microbes, and it is primarily used for the isolation of microorganisms.

Differential Media:

Differential media are used to differentiate closely related organisms or groups of organisms.

66.Write Composition of Teichoic Acid?

Teichoic Acid Composition: - (glycerol or ribitol + Phosphate)

67.Streak Plates Method?

Streak plate technique is used for the isolation into pure culture of the organisms (mostly bacteria), from mixed population. The inoculum is streaked over the agar surface in such a way that it "thins out" the bacteria. Some individual bacterial cells are separated and well spaced from each other

68.Chemical Used in Gram Staining?

Both gram-positive and gram-negative cells have peptidoglycan in their cell walls, so initially, all bacteria stain violet. Gram's iodine is applied as a mordant or fixative. Gram-positive cells form a crystal violet-iodine complex. Alcohol or acetone is used to decolorize the cells.

69.Viruses, Virion, And Virusoid And Prion?

Viruses:

Acellular organisms — Proteins and nucleic acids

Viroids:

Composed only of circular ssRNA (potato spindle tuber viroid)

Virusoids:

Contain circular ssRNA, need helper viruses for replication and encapsidation; also called satellite viruses

Prions: Infectious protems

70.Uses of UV In Lab?

- Used for the visualization of molecular samples,
- UV Crosslinkers.
- Fluorescence Analysis Viewing Cabinets and Work Stations. ...
- Ultraviolet Lamps.
- Digital Radiometers/Photometers

71.Physical Method of Sterilization?

Heat Method of Sterilization This is the most common method of sterilization. The heat used kills the microbes in the substance. In heat sterilization process, the longer the exposure to heat the better is the sterilization at a given temperature.

72.Disadvantage of Chlorine Sterilization?

First of all, high concentration of this agent corrodes metals and also damages cloths. Secondly the strength of this solution decreases with time so whenever you want to use it always prepare its fresh solution.

73.Name The Three Subgroups Of Spiral Bacteria?

These are curved shaped bacteria. They are further divided into 3 more subgroups.

- **Vibrio:** curved rods
- **Spirillum:** Helical but rigid
- **Spirochete**: Helical but flexible

74.Flagellum and Function?

Flagellum: Long filamentous structure that propels bacteria It helps the bacteria in movement.

75.Name the Types of Bacteria On The Basis Of Oxygen Requirement?

Obligate Aerobes: **Do** not grow without oxygen. It is necessary.

Facultative Anaerobes: Oxygen is necessary but start become anaerobes in its absence and can grow without off Or.

Obligate Anaerobes: Cannot grow in the presence of oxygen.

Aerotolerant Aerobes: Do not need Oz, also do not bother its presence e.

Microaerophiles: Aerobes but need small amount of oxygen. Cannot grow if available in large amount.

76.Conjugation, Transformation and Transduction (3)

Transformation: Naked DNA in solution is transferred from one bacterium to another during this process.

Conjugation: Genes transfer process can be mediated by plasmids. Plasmids are extra chromosomal circular DNA fragments that replicate independently of bacterial chromosome. Conjugation requires direct cell to cell contact and cells have to be opposite mating types.

Transduction: Transferring of a gene from a bacterium to another bacterium via a virus is called transduction. o When a bacteriophage infects a bacterium such as E. coli, 1t replicates inside E. coli and also produces a protein coat (which is called a capsid) in which viral DNA is packed before the virus is released.

77.Glycocalyx, Its Composition and Function?

It is the outermost layer of the cell wall, viscous and gelatinous in nature that surrounds the cells. It is composed of polysaccharide and polypeptide or both.

If glycocalyx is organized and firmly attached to the cell, it is called a capsule Plays important role in virulence (degree of pathogenicity) — Can also be a part of the vaccine against the bacteria to which it belongs.

Glycocalyx is also part of biofilms that bacteria make to attach to surfaces. Bacteria secrete extracellular polymeric substance (EPS) Biofilm protects cells within it.

It also facilitates communication amongst cells If glycocalyx is loosely attached to the cell, it is called slime.

78.Differentiate Between Vertical and Horizontal Gene Transfer and Name Three Horizontal Gene Transfer?

Vertical Gene Transfer:

This is a normal way of transferring genes from parents to offspring. This happens when a cell divide. Each daughter cell receives exactly what its parent cell has.

Horizontal Gene Transfer:

When genes are transferred from cells to cells within the same species, the process is called horizontal gene transfer. This can happen between cells of the same species, or across different species of organisms. Horizontal gene transfer involves a donor and a recipient cell. The recipient cell then incorporates received DNA into its own genome and this genome becomes a recombinant molecule or recombinant DNA. The cell that has this recombinant DNA in tt 1s called a recombinant cell.

Three processes are known by which genes can be transferred horizontally from one cell to the other, and they include

- Transformation
- Conjugation

- Transduction

79.Physical Requirements of Media

- ⇒ Temperature
- ⇒ pH
- ⇒ Osmotic Pressure

80.Three Types of Passive Movement

- ♥ Diffusion
- ♥ Facilitated Difussion
- ♥ Osmosis

81.Pili and Its Functions?

These are hair-like structure composed of pilin, usually one to ten in number. Longer than fimbriae Used for attachment to:

- Host cells
- Bacteria
- Used for DNA transfer from one bacterium to another during Conjugation (Sex pili)
- function in twitching Motility
- Gliding Motility

82.Physical Nature of Media?

- Solid Media
- Liquid Media

83.Define Antiseptic

An antiseptic is a substance that stops or slows down the growth of microorganisms. Like Ethanol, hydrogen Pr peroxide etc.

84.Germination of Spore

Exosporium:

A thin delicate outermost covering of the spore

Spore Coat:

2nd layer underneath the exosporium. It is thick and composed of several protein layers. Resistant to chemicals It contains enzymes for germination. Germination of spores into vegetative form occurs when nvironment becomes favorable for their growth.

Cortex:

It is the 3rd layer from outside in. It has peptidoglycan in it.

Spore Cell Wall or Core Wall:

Surrounds the protoplast or spore core

Spore Core:

Contains nucleoid and ribosomes

85.Writes Stages of Respiration of Glucose?

Glycolysis: Oxidation of glucose to pyruvic acid

Krebs Cycle: Oxidation of acetyl CoA to CO2

Electron Transport Chain: Coenzymes that carry electrons from Krebs cycle or glycolysis are oxidized to create ATP.

86.Define Buffers.

- Buffers are used to maintain desired pH.
- Bacteria grown in lab produce acids And Growth inhibited by acids.
- Peptones and amino acids are used as buffers.
- Phosphates are also used for buffers.

87.Enlist Microbial Identification Methods.

- Classical or Conventional Method
- Serological Methods
- Nucleic Acid based Methods

88.What Is Sporulation?

Sporulation is the formation of spores takes place within a vegetative cell and the process is called sporulation or sporogenesis. It is tiated when nutrients become unavailable.

89.Differentiate Between Viable and Direct Count?

Viable Cell Count:

A viable cell count allows one to identify the number of actively growing/dividing cells in a sample. The plate count method or spread plate relies on bacteria growing a colony on a nutrient medium. The colony becomes visible to the naked eye and the number of colonies on a plate can be counted.

Direct Cell Count.

Direct cell count refers to counting the cells in a liquid culture or colonies on a plate. It is a direct way of estimating how many organisms are present in a sample.

90.Describe Classification System Proposed by Robert H Whittaker

In 1969, five kingdom classification was proposed by Robert Whittaker as under:

- ⇒ **Plantae**: plants
- ⇒ **Animalia**: Animals
- ⇒ **Fungi:** Yeasts, molds and mushrooms
- ⇒ **Protista**: These are unicellular eukaryotes. Organisms that do not fit into any other category are placed in Protista. They are larger than prokaryotes. They include algae, protozoa, slime molds and water molds.
- ⇒ **Monera**: Bacteria

91.What Is Taxonomic Hierarchy?

All organisms can be grouped into a series of subdivisions that make up the taxonomic hierarchy.

- Genus
- Order
- Family
- Group
- Class
- Phylum
- Kingdom
- Domain

92.Enlist Types of Passive Transport.?

- ⇒ Simple Diffusion
- ⇒ Facilitated Diffusion
- ⇒ Osmosis

93.Give Classes Based On Function?

- Defined and complex media
- General purpose media
- Enriched media « Selective media
- Differential media

94.Define Passive Movement

Movement of substances with the concentration gradient. This means that substances will move from higher concentration of a substance to lower concentration. Gradient provides the force for movements of molecules and this happens with no energy expenditures.

95.What Is Function of Lysozymes?

A lysosome is a membrane-bound organelle found in nearly all animal cells. They are spherical vesicles that contain hydrolytic enzymes that can break down many kinds of biomolecules. Lysosomes are organelles that contain digestive enzymes. They digest excess or worn-out organelles, food particles, and engulfed viruses or bacteria.

96.What Are Fimbriae? Give Location and Function?

- ♣ Hair-like small appendages on G-neg cells
- ♣ Composed of pilin, a protein
- ♣ Can be at one pole or around the entire cell
- ♣ Used for attachment to surfaces of epithelial cell
- ♣ Fimbriae help bacteria attach to surfaces
- ♣ Fimbriae also help attach to epithelial cells e.g. Neisseria gonorrhoeae

97.Reverse Transcription

A reverse transcriptase is an enzyme used to generate complementary DNA from an RNA template, a process termed reverse transcription

98.Name Types of Culture Medium on The Basis of Function.

- Differential medium
- Selective medium
- Enriched medium
- Basal medium
- Reducing medium
- Selective medium
- General purpose medium

99. Write Functions of Cell Wall, Flagella and Ribosomes.

Cell wall: gives support and protection against plasmolysis.

Flagella: help bacteria in movement.

Ribosomes: are organelles that assist in protein synthesis during translation.

100. What Are Types of Microscopes?

- ⇒ Light microscope
- ⇒ Electron microscope
- ⇒ Scanning electron microscope
- ⇒ Transmission electron microscope
- ⇒ Dark field microscope

⇒ Bright field microscope
⇒ Fluorescent microscope

101. What Do You Know About Types of Teichoic Acid?

G-positive cell wall contains teichoic acid which may be divided into wall teichoic) acid and lipoteichoic acid0. Tetchoic acid is antigenic in nature and helps the cell wall by providing rigidity.

102. What Are the Physical And Chemical Methods For Making Smear On The Slide?

✶ **Physical method:** Heat
✶ **Chemical Methods:** Ethanol or formaldehyde

103. Write Characteristics of Integral Proteins.

⇒ inegral proteins act as channels or carriers in facilitated diffusion. Integral proteins are called transporters or rmeases
⇒ No energy is required during transportation of substances through these integral proteins Two kinds of transporters are known:
i. Nonspecific transporters
ii. specific transporters

104. Define Refractive Index.

Refractive Index:
Ability of a medium to bend the light
- Light rays move in a straight line through a single medium
- Light rays bend when the pass from one medium to another

105. Define L-Form Bacteria?

L-form organism is naturally occurring without cell wall. In other words, they have cell wall but under certain condition, they may lack a cell wall.

106. Industrial Microbiology?

Use of microbes or their enzymes for large scale production of biomolecules

107. MacConkey Agar?

♥ Nutrient agar + Bile salt + CV
♥ Selective & differential,
♥ Used for gut bacter

108. Two Types of Fermentation?

Lactic acid fermentation and alcoholic fermentation

109. What Is Microbiology?

Studying microbes is microbiology

110. Substrate Level Phosphorylation

The Direct transfer of P to ADP

111. Name Two Basic Dyes

- Crystal violet
- Methylene blue
- Safranin

112. Define Medical Microbiology.

Medical microbiology is a branch of medical science concerned with the prevention, diagnosis and treatment of infectious diseases.

In addition, this field of science studies various clinical applications of microbes for the improvement of health.

113. Characteristics of Microaerophiles

- Aerobes but O2 is required in low amounts.
- Produce O2 toxic compounds if exposed to more O2

114. What Is Resolation?

Resolation is the ability of the lenses to distinguish between two closely lying objects as separate. Light microscope resolving power is 0.2 um.

115. Write Three Differences Between Prokaryotes and Eukaryotes.

Prokaryotes

- DNA is not enclosed in a nuclear membrane.
- Chromosome: mostly Single, circular
- DNA not associated with histones
- No membrane enclosed organelles
- Cell wall has peptidoglycan, a complex carbohydrate.

Eukaryotes

- Divide by binary fission.
- DNA is enclosed in a membrane-bound nucleus.
- cDNA is found in multiple chromosomes.
- Chromosomes are linear, thread-like structures.
- DNA is associated with histones.
- Cell wall, if present, is chemically simple. Cellulose or Chitin
- They have membrane enclosed organelles.
- Mitochondria chloroplasts Endoplasmic reticulum Golgi apparatus Lysosomes etc

116. Write Methods for Bacterial Count?

- Plate Counts
  - Pour Plate Method
  - Spread Plate Method:
- Filtration:
- the most Probable Number Method:
- Direct Microscopic Count

117. Differ B/W Chemotaxis and Phototaxis: -

Phototaxis:

The movement of organism or its part towards the light is called Phototaxis.

Chemotaxis.

The movement of an organism towards specific stimulus or chemical substance called chemotaxis.

118. Write Types of Lipopolysaccharides?

⇒ Lipid A
⇒ Core polysaccharide
⇒ O side chain

119. Two Teichoic Acid Present In Bacterial Cell Wall?

- Lipoteichoic Acid
- Wallteichoic acid

120. Define Culture, Culture Medium, Inoculation?

Microbial growth in the lab is called a **culture.**

A nutrient material that supports the growth of microbes in the lab is called a **culture medium.**

Microbes introduced into a culture medium that initiate growth of organisms are known as **inoculum.**

121. Define Antiseptics.

Compounds that are used to remove pathogens from living tissue are known as antiseptics.

122. Define Phosphorylation?

The addition of an inorganic phosphate group to a chemical compound is called phosphorylation. e.g conversion of ADP into ATP in living tissues.

123. Explain Phases of Growth Curve?

In a batch culture, organisms go through various phases of growth. If we follow this growth with respect to time, and make a graph of this growth pattern, it will give us what we call as a growth curve. There are four distinct phases of this curve.

- Lag phase
- Log phase
- stationary phase
- Death phase.

124. What Is High Frequency of Recombinant?

In some cells that carry F+, F+ (Fertility factor) gets incorporated in the chromosomal DNA which converts F+ cells to high frequency of recombination cells (Hfr cells). When conjugation occurs between an Hfr cell and an F- cell, the Hfr cell's chromosome (with its integrated F factor) replicates, and a parental strand of the chromosome is transferred to the recipient cell. Since this transfer starts from the middle of F factor gene, and most of the time, this transfer is not complete; the whole chromosome of Hfr cell is not transferred. However, some genes can be transferred during this process. When these genes become integrated into the genomic DNA of the recipient cells, the recipient cells acquire new versions of genes that were not part of its genome previously. It may be noted that F- cells remains F- negative cell because F factor is not transferred completely. This whole process is illustrated in the accompanying diagram. These newly acquired genes can be mapped easily with respect to the time they get transferred to F- cells.

125. Differentiate Between Clone and Strain?

Clone: Population of cells derived from a single cell that are genetically identical.

Strain: A genetic variant of a clone is called a strain.

126. Differentiate Between Positive Sense and Negative Sense RNA.

The main difference between positive and negative sense RNA virus is that positive sense RNA virus consists of viral "ee mRNA that can be directly translated into proteins whereas negative sense RNA virus consists of viral RNA that is ra, complementary to the viral mRNA.

127. Explain Methods of Microbial Control In Detail

These methods can be broadly classified into four groups: Physical, Mechanical, Chemical and Biological

Physical Methods of Microbial Control

Heat: It is the cheapest sources of all and easily available to control microbial growth. Heat denatures enzymes: Methods that use heat can further be classified into dry and moist heat methods. Form of dry heat include:

- ⇒ Dry heat (hot-air oven),
- ⇒ Flaming (Platinum loop sterilization in the flame of Bunsen burner),
- ⇒ Incineration (burning of ashes).

Pasteurization: This technique typically employs low heat for killing pathogenic and food spoiling bacteria in milk. The following three equivalent heat treatments can be given to achieve pasteurization of milk:

- 63°C for 30 min °
- High-temperature short-time: 72°C for 15 sec
- Ultra-high-temperature: 140°C for 4 sec

Filtration: It is also a physical method. It can be used to filter air (using high efficiency particulate air filter) or liquid medium using membrane filters.

Radiation: Ionizing and non-ionizing radiation Ionizing Radiation

- **Ionization radiations** include gamma rays, X rays, or high-energy electron beams.
- **Non -ionizing Radiation**: wavelengths longer than 1nm fall into non-ionizing radiation. The best example is UV light.

Chemical Methods for Microbial Control:

Chemicals are used to control microbial growth. Factors that influence the efficacy of a chemical disinfectant include the concentration of the disinfectant, presence of organic matter in the environment (matrix) where the disinfectant is being used, pH of the environment (disinfectants are more effective at acidic pH), and time of exposure to the disinfectant.

128. Explain Salient Features of Viruses, Virions and viroids.

VIROIDS

These are infectious agents that consist only of RNA and found in plants only. No capsids, no envelopes, just RNA. They are covalently closed circular ssRNAs about 250 nucleotides long. The circular RNA normally exists as a rodlike shape due to intrastrain base pairing, which forms double stranded regions with single-stranded loops. They do not encode any gene products, so they are replicated by cellular DNA dependent RNA polymerase. A plant infected with such viroids not show any signs of illness. However, in other plants, they may cause severe disease. They cause the disease by NA silencing process.

VIRUSOIDS

They are similar to viroids,; however, they encode one or two gene products and need a helper virus to infect the host cells. The helper virus supplies gene products and other materials needed by the virusoid for completion of its replication cycle. Hepatitis D virusoid is a typical example which uses Hepatitis B virus as a helper.

PRIONS

These are proteinaceous infectious particles that cause neurodegenerative diseases such as scrapie in sheep, bovine spongiform encephalopathy, and Kuru in humans. These are abnormal form of cellular proteins. How these proteins accumulate in the cell is not clear, although, some genetic components are known to be involved.

129. How Fungi Can Be Identified by Biochemical Testing?

Filamentous fungi are mainly identified by morphology, and not by biochemical testing. Yeast if grown on solid medium grows like bacteria. In other words, colonies of yeast look like bacterial colonies but are bigger in size.

Yeasts can grow as facultative anaerobes. Saccharomyces if given oxygen to grow, it converts carbohydrates aerobically and produces CO2 and water, however, if oxygen is denied, carbohydrates get converted fermentatively into ethanol and CO2.

130. Write Names Of 5 Types of Bacteria With Respect To Temperature.

Organisms are basically classified into three groups based on the temp requirements:

Psychrophiles: These are further divided into strict psychrophiles and psychrotrophs: **Psychrotrophs:** Cold loving: 15 oC. **Psychrotrophs:** Optimum temp 1s 20-30 oC.

Food spoilage bacteria that can spoil food during refrigeration.

Mesophiles: 25 — 40 oC: These are the ones that cause diseases in animals and humans. Moderate temp loving organisms.

Optimum: 37C as this is the body temperature of humans and animals.

Thermophiles: 50 — 60 oC o Heat loving o Important in organic compost piles. These are further divided into hyperthermophiles that grow optimally at 80 oC. They live in hot springs. Every group of these organisms has a: o Minimum growth temp o Optimum growth temp. o Maximum growth temp.

131. Write Characteristic of Metachromatic Granules

⇒ Also called volutin, they stain red with certain dyes such as methylene blue. That is why they are called metachromatic

⇒ Large inclusions ¢ These inclusions contain inorganic phosphates. Inorganic phosphates are used up in ATP synthesis.

⇒ Characteristics of Corynebacterium diphtheria: This bacterium can be identified by the presence of these granules in it.

132. Define Magnification?

Magnification is the enlargement of an object its formula is Magnification of objective lens x magnification of ocular lens

133. Reverse Transcription?

A reverse transcriptase is an enzyme used to generate complementary DNA from an RNA template, a process termed reverse transcription

