CHERCHER SECONDARY SCHOOL

WORKSHEET ON "MICROORGANISMS" FOR GRADE 12 NS STUDENTS, 2016 E.C.

Directions: This worksheet consists of 200 multiple-choice questions. Each question has four options (A, B, C, D). Select the correct answer and write the letter of your choice on your answer sheet.

1. What are microorganisms?
   A. Organisms visible to the naked eye
   B. Organisms found only in water and soil
   C. Organisms studied using telescopes
   D. Organisms observed using microscopes
2. Which of the following is wrong about microorganisms?
   A. They cannot carry out metabolic processes on their own.
   B. They play both beneficial and harmful roles in human health.
   C. They are ubiquitous and can be found in various environments.
   D. They form various symbiotic relationships with plants and animals..
3. Which branch of microbiology focuses on the study of algae?
   A. Protozoology
   B. Mycology
   C. Bacteriology
   D. Phycology
4. Which domain includes unicellular and multicellular protists, fungi, and algae?
   A. Eukarya
   B. Archaea
   C. Eubacteria
   D. Protista
5. Which of the following is a characteristic of eubacteria?
   A. They have a nucleus.
   B. They lack a cell wall.
   C. All bacteria are parasites.
   D. They are unicellular organisms.
6. What is the primary characteristic that distinguishes bacteria from eukaryotic microorganisms?
   A. Ability to photosynthesize
   B. Membrane-bound organelles
   C. Prokaryotic nature
   D. Presence of a ribosome
7. Identify the correct statement about bacteria.
   A. Bacteria serve no useful purpose in ecosystems.
   B. Bacteria reproduce rapidly through binary fission.
   C. Bacteria rely on the host cell's enzymes to replicate.
   D. Bacteria have a narrow range of metabolic pathways.
8. Which term refers to a distinct region within the prokaryotic cell where the genetic material is located?
   A. Nucleoid
   B. Cytoplasm
   C. Nucleus
   D. Nucleolus

9. Which of the below statements is correct about bacterial plasmids?
    A. Plasmids are linear DNA molecules in bacterial cells.
    B. Plasmids cannot be transferred between bacterial cells.
    C. They are typically smaller than the chromosomal DNA.
    D. Plasmids are the main genetic material in bacterial cells.
10. What protects bacterial cells from desiccation (drying out)?
    A. Capsule
    B. Flagella
    C. Cell wall
    D. Plasmid
11. To some extent, the scientific name of a bacterium can provide information about its shape. Based on this, which of the following is a rod-shaped bacterium?
    A. *Treponema pallidum*
    B. *Staphylococcus aureus*
    C. *Vibrio cholerae*
    D. *Bacillus anthracis*
12. What term is used to describe bacteria that typically occur as pairs of spherical cells?
    A. Streptococci
    B. Staphylococci
    C. Diplococci
    D. Diplobacilli
13. Among the following bacteria, which one has a different shape than the rest?
    A. *Treponema pallidum*
    B. *Campylobacter jejuni*
    C. *Vibrio cholerae*
    D. *Helicobacter pylori*
14. Which component of bacterial cells plays a crucial role in the differential staining observed in Gram staining?
    A. Capsule
    B. Cell wall
    C. Flagella
    D. Plasma membrane
15. Which of the following is a characteristic feature of Gram-negative bacteria?
    A. They are more susceptible to antibiotics than Gram-positive bacteria.
    B. They retain the crystal violet stain during the Gram staining procedure.
    C. Gram-negative bacteria stain pink or red during the Gram staining process.
    D. Gram-negative bacteria have a thick layer of peptidoglycan in their cell wall.
16. What is the critical step in Gram staining that determines the outcome of the staining process?
    A. Application of safranin
    B. Addition of iodine solution
    C. Application of crystal violet
    D. Ethanol or acetone decolorization

17. How do antibiotics primarily target bacterial cells while sparing eukaryotic cells in our bodies?

    A. By targeting eukaryotic-specific enzymes
    B. By attacking the mitochondria of bacterial cells
    C. By inhibiting the synthesis of bacterial cell walls
    D. By disrupting the cell membrane of bacterial cells

18. What is the term for bacteria that can synthesize all the organic compounds needed for their growth using simple inorganic substances?

    A. Autotrophs
    B. Saprotrophs
    C. Heterotrophs
    D. Oligotrophs

19. Among the following bacteria, which one has a different nutrition type than the rest?

    A. Nitrifying bacteria
    B. Iron-oxidizing bacteria
    C. Purple nonsulfur bacteria
    D. Hydrogen-oxidizing bacteria

20. Which of the following is an example of a photolithoautotroph?

    A. *Thiobacillu*s
    B. Methanogens
    C. Cyanobacteria
    D. *Escherichia coli*

21. Which of the following best describes the nutritional strategy of chemoorganoheterotrophs?

    A. They use CO_2 as their carbon source for biosynthesis.
    B. They obtain energy and carbon from organic compounds.
    C. They produce organic compounds from inorganic sources.
    D. They use light energy and have CO_2 as their carbon source.

22. What is the primary method of asexual reproduction in bacteria?

    A. Budding
    B. Conjugation
    C. Transduction
    D. Binary fission

23. What term refers to the transfer of genetic material between bacterial cells by direct cell-to-cell contact?

    A. Conjugation
    B. Transformation
    C. Binary fission
    D. Transduction

24. Put the below steps of binary fission in their correct sequence:

    1. Cytokinesis
    2. DNA replication
    3. Formation of the septum
    4. Chromosome segregation

    A. 1,2,3,4
    B. 3,1,4,2
    C. 2,4,3,1
    D. 4,3,2,1

25. What act as vectors for the transfer of bacterial genetic material during transduction?

    A. Sex pili
    B. Plasmids
    C. Insect vectors
    D. Bacteriophages

26. How is *Bordetella pertussis* primarily transmitted?

A. Food and water
B. Airborne droplets
C. Vector-borne transmission
D. Direct contact with infected skin

27. Which of the following diseases can be cured using antibiotics?

A. Candidiasis
B. Amoebiasis
C. Salmonellosis
D. Trichomoniasis

28. Which of the following diseases is caused by an acid-fast Gram-positive *Mycobacterium*?

A. Syphilis
B. Pertussis
C. Tetanus
D. Tuberculosis

29. Which of the following diseases affects the urethra, cervix, oviduct, pharynx, epididymis, eyes, and is transmitted by sexual contact?

A. AIDS
B. Chancroid
C. Gonorrhea
D. Syphilis

30. Identify the correct statement about archaea.

A. Archaeal cell walls lack true peptidoglycan.
B. Archaea possess a membrane-bound nucleus.
C. Archaea are limited to extreme environments.
D. Archaea reproduce asexually through conjugation.

31. What is the common characteristic of Archaea and Bacteria?

A. They are eukaryotic
B. They are multicellular
C. They are prokaryotic
D. They are macroscopic

32. What is a defining characteristic of Archaea that distinguishes them from bacteria?

A. Ester-linked lipids in their cell membranes
B. Reliance on ether lipids in cell membranes
C. Presence of peptidoglycan in their cell walls
D. Engaging in photosynthesis using chlorophyll a.

33. What is a characteristic feature of methanogens?

A. Strictly aerobic organisms
B. Facultatively anaerobic organisms
C. Strictly anaerobic organisms
D. Microaerophilic organisms

34. How do methanogens contribute to the greenhouse effect and global warming?

A. Through the depletion of the ozone layer
B. By converting carbon dioxide into ozone
C. By releasing oxygen into the atmosphere
D. By producing and releasing methane (CH_4)

35. In which type of environment do extreme halophiles thrive?

A. Acidic environments
C. Oxygen-rich environments
B. Highly saline environments
D. Low-temperature environments

36. Where are extreme thermophiles commonly found?

A. Polar ice caps
C. Tropical rainforests
B. Deep ocean trenches
D. Near volcanic vents and fissures

37. *Sulfolobus solfataricus* is typically found in extreme environments such as acidic hot springs and geothermal areas. To what major group of archaea does it belong?

A. Methanogens
C. Extreme halophiles
B. Extreme thermophiles
D. Thermophilic extreme acidophiles

38. Which of the following is **NOT** a microorganism associated with causing diseases in humans?

A. Fungi
C. Viruses
B. Bacteria
D. Archaea

39. What is the initiator amino acid in archaea during the initiation phase of protein synthesis?

A. Methionine
C. N-Formylmethionine
B. Phosphotyrosine
D. Methylated mRNA

40. Which of the following statements is true regarding archaeal reproduction?

A. Archaea reproduce only through longitudinal fission.
B. Archaea reproduce exclusively through fragmentation.
C. Some archaeal species may reproduce through budding.
D. Archaea reproduce exclusively through sexual processes.

41. Which of these is correct about nutrition in archaea?

A. All archaea cannot survive in the presence of oxygen.
B. Archaea rely exclusively on photosynthesis for energy.
C. All archaea are pathogenic and cause diseases in plants.
D. Archaea are known for their diverse nutritional strategies.

42. Which one is true about the beneficial roles archaea play in various ecological and industrial processes?

A. They produce enzymes that have applications in industries.
B. They contribute to the emissions of a potent greenhouse gas.
C. Archaea are major players in the alcohol and bread industries.
D. They have been found in association with periodontal disease.

43. What commercial applications are Archaea commonly exploited for?

A. Energy production
C. Clothing production
B. Food preservation
D. Detergent manufacturing

44. What is the significant role of *Thermus aquaticus* in molecular biology?

A. Gene expression analysis
C. DNA amplification in PCR
B. Protein expression and purification
D. Environmental remediation

45. What is mycotoxicology?

A. Study of fungal toxins
C. Study of fungal structure
B. Study of fungal diseases
D. Study of fungal reproduction

46. Which of the following is true about fungi?

A. Fungi possess chlorophyll and are photosynthetic.
B. Fungi obtain nutrients through absorptive nutrition.
C. Microscopic fungi do not have sexual reproduction.
D. Most fungi have flagella which is used for movement.

47. What is the primary function of fungal hyphae?

A. Reproduction
C. Photosynthesis
B. Gas exchange
D. Nutrient absorption

48. In which type of environment are fungi frequently found?

A. High-altitude areas
C. Hot, bright and dry places
B. Sunny and arid places
D. Cool, dark, and moist places

49. Which component provides the photosynthetic capability in lichens?

A. Fungus
C. Alga
B. Archaea
D. Bacteria

50. Which of the following statements correctly describes fungal saprobes?

A. They obtain nutrients by decomposing dead or waste organic matter.
B. Fungal saprobes have a special preference for living host organisms.
C. They have economic impacts on agriculture by causing crop diseases.
D. Fungal saprobes involve in mutualistic relationships with microalgae.

51. Which of these is a well-known representative of Zygomycota?

A. *Candida*
C. *Penicillium*
B. *Rhizopus*
D. *Aspergillus*

52. What is the name of the sexual spores produced by ascomycetes?

A. Zoospores
C. Ascospores
B. Zygospores
D. Basidiospores

53. Which of the following fungi is used in the production of citric acid?

A. *Aspergillus niger*
C. *Penicillium notatum*
B. *Candida albicans*
D. *Rhizopus stolonifer*

54. What group of fungi forms mycorrhizal associations with the roots of plants?

A. Zygomycota
C. Glomeromycota
B. Basidiomycota
D. Chytridiomycota

55. What spores are formed by the fragmentation of hyphal cells into separate and distinct units?

A. Ascospores
C. Conidiophores
B. Arthrospores
D. Sporangiospores

56. What is the causative agent of athlete's foot?

A. *Candida albicans*
C. *Trichophyton rubrum*
B. *Aspergillus fumigatus*
D. *Cryptococcus neoformans*

57. What type of microorganism is yeast?

A. Bacterium
C. Fungus
B. Archaea
D. Protozoa

58. What is the primary role of yeast in bread making?

A. Adding flavor
C. Providing nutrients
B. Improving texture
D. Leavening the dough

59. Which yeast species is commonly associated with baking and brewing?

A. *Aspergillus niger*
C. *Candida albicans*
B. *Rhizopus stolonifer*
D. *Saccharomyces cerevisiae*

60. Which type of toxins are produced by certain molds and are considered poisonous carcinogens and mutagens?

A. Ergot
C. Mycetismus
B. Aflatoxins
D. Ochratoxins

61. Which mold species is particularly known for producing aflatoxins?

A. *Aspergillus flavus*
C. *Claviceps purpurea*
B. *Rhizopus stolonifer*
D. *Penicillium notatum*

62. Which term specifically refers to the ingestion of toxic substances present in mushrooms?

A. Ergotism
C. Aflatoxicosis
B. Mycotoxicoses
D. Mycetism

63. Which parts of the human body do superficial fungal infections primarily affect?

A. Mouth, throat, and nose
C. Lungs, genitals, and mouth
B. Skin, scalp, hair, and nails
D. Nose, throat, and genitals

64. Which genera of fungi are commonly associated with superficial fungal infections?

A. *Candida*, *Agaricus* and *Aspergillus*

B. *Rhizopus*, *Mucor*, and *Cladosporium*

C. *Saccharomyces*, *Penicillium*, and *Histoplasma*

D. *Trichophyton*, *Epidermophyton*, and *Microsporum*

65. Which of the following is a superficial fungal infection affecting the nails?

A. Tinea corporis

B. Tinea capitis

C. Tinea pedis

D. Tinea unguium

66. How are superficial fungal infections commonly transmitted?

A. Airborne particles

B. Direct human contact

C. Waterborne transmission

D. Foodborne transmission

67. Which type of microorganism is responsible for causing candidiasis?

A. Virus

B. Fungus

C. Bacteria

D. Protozoa

68. What is the most common causative agent of thrush?

A. *Candida albicans*

B. *Trichophyton rubrum*

C. *Aspergillus fumigatus*

D. *Cryptococcus neoformans*

69. What is the most likely respiratory disease if a patient presents with wheezing, coughing with blood, shortness of breath, and chest pain?

A. Asthma

B. Tuberculosis

C. Aspergillosis

D. Pneumonia

70. How would you describe the cellular structure of protozoa?

A. Multicellular with cell walls

B. Multicellular without cell walls

C. Unicellular with cell walls

D. Unicellular without cell walls

71. What is the primary function of cilia in Paramecium?

A. Protection

B. Nutrient absorption

C. Locomotion

D. Cell division

72. Which type of locomotion is characteristic of *Giardia lamblia*?

A. Amoeboid motion

B. Flagellar movement

C. Ciliary action

D. Sessile behavior

73. Which reproductive process involves the fusion of two haploid micronuclei in protozoa?

A. Binary fission

B. Conjugation

C. Budding

D. Syngamy

74. Which of the following is a common method of asexual reproduction in protozoa where a cell divides evenly to form two new cells?
    A. Budding
    B. Binary fission
    C. Conjugation
    D. Multiple fission
75. What is another term for multiple fission in protozoa where the nucleus divides multiple times before the rest of the cell divides?
    A. Conjugation
    B. Schizogony
    C. Binary fission
    D. Budding
76. Which microorganism is capable of both autotrophic and heterotrophic nutrition?
    A. Amoeba
    B. Paramecium
    C. Euglena
    D. Plasmodium
77. What is the nutritional mode that involves using nutrients dissolved in the surrounding medium?
    A. Saprozoic
    B. Autotrophic
    C. Heterotrophic
    D. Phototrophic
78. What is the primary nutritional strategy of amoeba?
    A. Absorption
    B. Saprotroph
    C. Phagocytosis
    D. Photosynthesis
79. Which type of mosquito is the primary vector for transmitting *Plasmodium* parasites to humans?
    A. Aedes mosquito
    B. Culex mosquito
    C. Anopheles mosquito
    D. Mansonia mosquito
80. Which of the following diseases is caused by the flagellated protozoan *Trichomonas vaginalis*?
    A. Amoebiasis
    B. Trichomoniasis
    C. Chagas disease
    D. Malaria
81. Which protozoan parasite is responsible for causing sleeping sickness in humans?
    A. *Toxoplasma gondii*
    B. *Plasmodium falciparum*
    C. *Trypanosoma cruzi*
    D. *Trypanosoma brucei*
82. What is the primary vector for transmitting the parasite causing sleeping sickness?
    A. Mosquitoes
    B. Tsetse flies
    C. Fleas
    D. Sandflies
83. To what genus does the protozoa causing Kala-azar belong?
    A. Giardia
    B. Leishmania
    C. Plasmodium
    D. Trypanosoma

84. What is the disease characterized by symptoms such as severe diarrhea, abdominal cramps, and greasy, foul-smelling stools due to impaired nutrient absorption?
    A. Giardiasis
    B. Salmonellosis
    C. Amoebiasis
    D. Gastroenteritis
85. What is the most likely disease if a patient experiences symptoms such as recurrent episodes of fever accompanied by chills and sweating, headache, muscle and joint pain, fatigue, nausea, and vomiting?
    A. Malaria
    B. Food poisoning
    C. Influenza
    D. Sleeping sickness
86. Which of the following is a feature shared by all viruses?
    A. Dependency on host cells for replication
    B. Presence of a cell membrane and ribosomes
    C. Both DNA and RNA in their genetic material
    D. Envelope derived from the host cell membrane
87. Identify the incorrect one among the below statements about viruses.
    A. The capsid encloses the genetic material of a virus.
    B. The size of viruses typically ranges from 20 to 450 μm.
    C. Viruses can not replicate and reproduce outside a host cell.
    D. Viral genetic material can be either DNA or RNA, but not both.
88. What is the function of the spike protein on the surface of enveloped viruses?
    A. Virus replication
    B. Viral entry inhibition
    C. Genetic material protection
    D. Cellular attachment and entry
89. Which term is used to describe the protein subunits that make up capsids?
    A. Envelopes
    B. Prophages
    C. Capsomeres
    D. Nucleocapsids
90. What is the primary role of the capsid in a virus?
    A. Energy production
    B. Protection of nucleic acid
    C. Host cell recognition
    D. Synthesis of proteins
91. Which of the following is an example of a virus with helical symmetry?
    A. Toga virus
    B. Papovavirus
    C. Tobacco mosaic virus (TMV)
    D. Adenovirus
92. Which type of symmetry is adopted by the capsids of nearly all spherical viruses?
    A. Radial symmetry
    B. Helical symmetry
    C. Complex symmetry
    D. Icosahedral symmetry

93. What is the primary distinguishing feature of retroviruses?

A. They cause immediate cell lysis upon infection.

B. They use reverse transcription during replication.

C. They never integrate their RNA into the host DNA.

D. They carry DNA and RNA as their genetic material.

94. In the reproductive cycle of retroviruses like HIV, what role does reverse transcriptase play?

A. Initiates the fusion of the capsid with the host cell membrane

B. Performs reverse transcription to convert viral RNA into DNA

C. Facilitates the conversion of viral DNA into doubl-stranded RNA

D. Promotes viral maturation, budding and release from the host cell

95. What is a key criterion used to differentiate between DNA and RNA viruses?

A. The number of viral proteins produced

B. The presence or absence of a protein coat

C. The nature of the viral genome

D. The type of host organism infected

96. In which cellular compartment does replication mainly occur for most DNA viruses?

A. Nucleus

B. Cytoplasm

C. Cell membrane

D. Golgi apparatus

97. What is the term for the viral DNA integrated into the host genome during the lysogenic cycle?

A. Plasmid

B. Ribosome

C. Prophage

D. Capsid

98. Which of the following statements is true regarding the lysogenic cycle?

A. It leads to the immediate lysis or rupture of the host cell.

B. It allows the virus to remain dormant within the host cell.

C. The viral genome remains separate from the host genome.

D. It is characterized by lower mutation rate than the lytic cycle.

99. During the lytic cycle, what is the function of the viral enzyme called lysozyme?

A. Cleaving specific viral proteins for assembly

B. Integration of viral DNA into the host genome

C. Breaking down the host cell wall for viral release

D. Converting RNA to DNA during viral replication

100. What is the first step in the viral reproduction cycle?

A. Penetration

B. Synthesis

C. Adsorption

D. Maturation

101. Which step involves the entry of virions or their genome into host cells?

A. Maturation
C. Release
B. Penetration
D. Adsorption

102. During which step does the assembly of newly synthesized viral components into complete virions occur?

A. Synthesis
C. Adsorption
B. Maturation
D. Penetration

103. Which of the following steps in the viral replication cycle may lead to the death of host cells?

A. Release
C. Synthesis
B. Maturation
D. Adsorption

104. Select the correct statement regarding bacteriophages.

A. They are the least abundant entities in the biosphere.
B. They are bacteria that infect and replicate within viruses.
C. They play a crucial role in regulating bacterial populations.
D. They contain both DNA and RNA genome simultaneously.

105. The five stages of the bacteriophage lytic cycle occur in this order:

A. Penetration, Attachment, Release, Maturation, Biosynthesis.
B. Attachment, Penetration, Release, Biosynthesis, Maturation.
C. Attachment, Penetration, Biosynthesis, Maturation, Release.
D. Penetration, Biosynthesis, Attachment, Maturation, Release.

106. What component of a bacteriophage is responsible for recognizing and attaching to the host bacterial cell?

A. Base plate
C. Tail sheath
B. Tail fibers
D. Hexagonal head

107. Which organ is commonly affected by mumps?

A. Liver
C. Pancreas
B. Spleen
D. Salivary gland

108. What is the primary mode of transmission for the measles virus?

A. Contaminated food
C. Mosquito bites
B. Respiratory droplets
D. Sexual contact

109. Which of the following populations is at a higher risk of rabies exposure?

A. Commercial sex workers
C. Children under the age of five
B. Soldiers in the battlefield
D. Veterinarians and animal handlers

110. What is the best preventive measure for avoiding the common cold?

A. Annual influenza vaccination
C. Antibiotic treatment
B. Regular handwashing and hygiene
D. Avoiding outdoor activities

111. What virus causes chickenpox?

A. Influenza virus
C. Varicella-zoster virus
B. Epstein-Barr virus
D. Herpes simplex virus

112. Which of the below viral diseases can be prevented by the proper disposal of sewage?

A. Measles
C. Poliomyelitis
B. Chickenpox
D. Common cold

113. Which of the following is a common symptom of chickenpox?

A. Sore throat
C. Intense coughing
B. Vesicular skin rash
D. Swollen joints

114. Which term refers to the community of microorganisms that naturally inhabit various surfaces of the human body without causing disease under normal conditions?

A. Normal microbiota
C. Non-harmful microbes
B. Resident microbiota
D. Transient microbiota

115. What term refers to the community of microorganisms that are consistently present and established in the human body?

A. Resident microbiota
C. Normal microbiota
B. Transient microbiota
D. Non-harmful microbes

116. Which of the following is a function of normal microbiota in the human body?

A. Nutrient Synthesis
C. Inducing diseases
B. Vaccine production
D. Inhibiting digestion

117. Which one is a mechanism by which normal microbiota help prevent the establishment and growth of harmful pathogens?

A. Production of inhibitory substances
C. Disruption of host homeostasis
B. Evasion of the host's immune system
D. Triggering inflammatory responses

118. Which one can negatively affect the composition and diversity of the normal microbiota?

A. Regular physical activity
C. Breastfeeding
B. Broad-spectrum antibiotics
D. Frequent travel

119. What bacterium can overgrow in the colon when the normal balance of the intestinal microbiota is disturbed?

A. *Clostridium difficile*
C. *Clostridium innocuum*
B. *Clostridium butyricum*
D. *Clostridium histolyticum*

120. Where is the largest population of normal microbiota found in the human body?

A. Lungs
C. Skin
B. Intestines
D. Eyes

121. Which of the following is an example of a probiotic microorganism often found in yogurt?
    A. *Escherichia coli*
    B. *Lactobacillus acidophilus*
    C. *Staphylococcus aureus*
    D. *Streptococcus pneumoniae*
122. Who is credited with the development of the germ theory of disease?
    A. Louis Pasteur
    B. Leeuwenhoek
    C. Robert Koch
    D. Joseph Lister
123. What is the main concept of the germ theory of disease?
    A. Diseases are caused by spoiled food.
    B. Microorganisms can cause diseases.
    C. Germs can arise spontaneously.
    D. Microorganisms can spoil wine.
124. Which of the following is the first step of Koch's postulates?
    A. Inoculation of a pure culture into a susceptible host
    B. Recovery of the microorganism from the inoculated host
    C. Isolation of the microorganism from diseased individuals
    D. Observation of the same microorganism in every case of the disease
125. What is the primary purpose of Koch's postulates?
    A. To identify the pathogenic bacteria from the non-pathogenic ones
    B. To study how pH of a growth medium influences microbial growth
    C. To develop ways of classifying bacteria based on cell wall composition
    D. To establish a causal relationship between a microorganism and a disease
126. Which of the following statements is correct about Koch's postulates?
    A. They are universally applicable to all agents causing infectious diseases.
    B. They can be easily applied to establish causation in multifactorial diseases.
    C. In some cases, it may be unethical or impractical to fulfill Koch's postulates.
    D. They account for individuals who may carry a germ without showing symptoms.
127. What is the primary mode of transmission for respiratory diseases?
    A. Droplet transmission
    B. Vector-borne transmission
    C. Vehicle transmission
    D. Contact transmission
128. Which of the following diseases is commonly transmitted through respiratory droplets?
    A. Botulism
    B. Malaria
    C. Influenza
    D. Gonorrhea
129. Which of the following conditions increases the likelihood of respiratory droplet transmission of infectious agents?
    A. Sharing of sharp objects
    B. Raw food consumption
    C. Crowded indoor spaces
    D. Creating standing water

130. Which of the following pathogens is commonly associated with waterborne infections?
    A. Influenza virus
    B. *Vibrio cholerae*
    C. Human papillomavirus (HPV)
    D. *Mycobacterium tuberculosis*
131. What is a common symptom of waterborne infections caused by fecal contamination?
    A. Diarrhea
    B. Skin rash
    C. Joint pain
    D. Respiratory distress
132. What is the primary mode of transmission for waterborne infections?
    A. Airborne droplets
    B. Vector (insect) bites
    C. Direct person-to-person contact
    D. Ingestion of contaminated water
133. What agents are responsible for most food poisoning cases?
    A. Fungi
    B. Bacteria
    C. Viruses
    D. Protozoa
134. Which of the following microorganisms is commonly associated with foodborne diseases?
    A. *Brucella*
    B. *Aspergillus*
    C. *Salmonella*
    D. *Trypanosoma*
135. Which disease can be transmitted through both waterborne and foodborne routes?
    A. Cholera
    B. Botulism
    C. Listeriosis
    D. Typhoid fever
136. Which of the following measures is effective in the prevention of foodborne infections?
    A. Raw meat consumption
    B. Consumption of spicy foods
    C. Washing fruits and vegetables
    D. Storing food at room temperature
137. What is the most common mode of transmission for fungal skin infections?
    A. Insect vectors
    B. Direct contact
    C. Sexual intercourse
    D. Contaminated water
138. Which of the following infections is transmitted through contaminated surfaces like floors and showers?
    A. Candidiasis
    B. Farmers' lung
    C. Athlete's foot
    D. Salmonellosis
139. Which of the following measures is effective in preventing the transmission of diseases primarily spread through direct contact?
    A. Mosquito control
    B. Water purification
    C. Avoiding raw meat
    D. Good personal hygiene
140. Which of the following is a common bacterial sexually transmitted infection?
    A. Syphilis
    B. HIV/AIDS
    C. Candidiasis
    D. Trichomoniasis

141. Which of the following behaviors increases the risk of Hepatitis B transmission?

A. Injection drug use
C. Abstinence from alcohol
B. Avoiding handwashing
D. Drinking untreated water

142. What is a common preventive measure for healthcare workers to reduce the risk of bloodborne infections?

A. Avoiding contact with patients
C. Maintaining good personal hygiene
B. Handwashing with soap and water
D. Using personal protective equipment

143. What is the primary mode of transmission for vector-borne diseases like malaria and dengue fever?

A. Direct contact
C. Airborne transmission
B. Vector (insect) bites
D. Foodborne transmission

144. Which group of microbes is essential for converting atmospheric nitrogen into a form that plants can use?

A. Fungi
C. Viruses
B. Bacteria
D. Archaea

145. What is the role of *Rhizobium* bacteria in agriculture?

A. Breaking down organic matter
C. Producing toxins for insect control
B. Converting atmospheric N_2 into NH_3
D. Solubilizing phosphorus in the soil

146. What is the primary role of anaerobic bacteria in wastewater treatment?

A. Enhance water clarity
C. Accelerate aerobic processes
B. Production of ethane gas
D. Reducing the volume of sludge

147. How does methane gas produced by anaerobic bacteria in sewage treatment benefit us?

A. It increases water acidity.
C. It facilitates phosphorus removal.
B. It acts as a soil conditioner.
D. It serves as an alternative energy source.

148. What benefit do anaerobic bacteria provide in sewage treatment?

A. Phosphorus removal
C. Carbon dioxide emission
B. Oxygenation of water
D. Increasing nitrogen content

149. What is the primary goal of bioremediation?

A. To increase the concentration of pollutants in the environment`
B. To introduce harmful toxins and chemicals into the environment
C. To exploit the ability of microorganisms to break down pollutants
D. To remove bacteria and other microbes from polluted environments

150. In bioremediation, what happens to the population of microbes when a contaminant is present?

A. Increases
C. Stays constant
B. Decreases
D. Becomes dormant

151. What is a typical outcome of the bioremediation process in terms of residues?
    A. Toxic byproducts
    C. Harmless products
    B. Radioactive waste
    D. Harmful chemicals
152. What is the process that uses living organisms to remove or neutralize pollutants from contaminated environments?
    A. Nitrogen fixation
    C. Bioremediation
    B. Decontamination
    D. Anaerobic digestion
153. What is the main function of microbes in bioremediation regarding organic pollutants?
    A. Mobilization
    C. Accumulation
    B. Immobilization
    D. Transformation
154. What crucial role do microbes play in food production and processing?
    A. Food spoilage
    C. Fermentation
    B. Pasteurization
    D. Decomposition
155. Which bacteria are involved in the fermentation of milk to produce yogurt?
    A. *Lactobacillus brevis* and *Streptococcus pyogenes*
    B. *Lactobacillus kefiri* and *Streptococcus agalactiae*
    C. *Lactobacillus rhamnosus* and *Staphylococcus aureus*
    D. *Lactobacillus bulgaricus* and *Streptococcus thermophilus*
156. Which bacterial activity is essential for the souring of cream in the initial stages of butter production?
    A. Lactose fermentation
    C. Acetic acid fermentation
    B. Alcohol fermentation
    D. Butyric acid fermentation
157. Which area of research in gene therapy involves the use of microorganisms as vectors?
    A. Immunotherapy
    C. Microbial genomics
    B. Bacterial resistance
    D. Treatment of defective genes
158. In the context of gene therapy, what is the role of genetically modified bacteria like *Escherichia coli*?
    A. Producing antibiotics
    C. Delivering therapeutic genes
    B. Targeting viral infections
    D. Enhancing microbial resistance
159. What role do beneficial bacteria play in the digestive system?
    A. Enhancing water absorption
    C. Producing harmful pathogens
    B. Help in the digestion of food
    D. Initiating alcohol fermentation
160. What is the outcome of competitive exclusion by beneficial bacteria in the gut?
    A. Proliferation of harmful pathogens
    C. Enhanced microbial growth
    B. Prevention of harmful bacteria proliferation
    D. Inhibition of vitamin synthesis

161. How do certain strains of bacteria contribute to immune defense in the gut?
    A. By facilitating the absorption of harmful toxins
    B. By promoting the growth of harmful pathogens
    C. By preventing the colonization of useful microbes
    D. Through competitive exclusion of harmful bacteria
162. Which achievement in medicine is a result of using biotechnological techniques with microorganisms?
    A. Cloning of animals using genetic engineering
    B. Production of synthetic materials using wastes
    C. Development of human insulin and growth hormones
    D. Fermentation to make alcoholic beverages and bread
163. What is the role of *Bacillus thuringiensis* (Bt) in agriculture?
    A. Producing toxins lethal to insect pests
    B. Fixing atmospheric nitrogen in the soil
    C. Enhancing nutrient availability for plants
    D. Converting atmospheric nitrogen into ammonia
164. Which process involves bacteria breaking down organic matter into simpler compounds in the carbon cycle?
    A. Photosynthesis
    B. Decomposition
    C. Respiration
    D. Fossilization
165. What is the primary role of photosynthetic bacteria in the carbon cycle?
    A. Respiration
    B. Decomposition
    C. Carbon fixation
    D. Methane production
166. Which type of bacteria convert atmospheric nitrogen into ammonia?
    A. Nitrifying bacteria
    B. Nitrogen-fixing bacteria
    C. Denitrifying bacteria
    D. Decomposing bacteria
167. Which bacterium is not symbiotically associated with plant roots, making it a free-living nitrogen fixer?
    A. *Frankia*
    B. *Rhizobium*
    C. *Azotobacter*
    D. *Bradyrhizobium*
168. Which bacteria are responsible for converting nitrate into nitrogen gas or nitrous oxide?
    A. Nitrifying bacteria
    B. Denitrifying bacteria
    C. Nitrogen-fixing bacteria
    D. Ammonifying bacteria
169. How do legume plants benefit from a symbiotic relationship with nitrogen-fixing bacteria?
    A. They gain a direct supply of fixed nitrogen.
    B. They undergo photosynthesis more efficiently.
    C. They receive protection from pests.
    D. They obtain phosphorus from the bacteria.

170. What is the primary role of *Nitrobacter* in nitrification?
    A. Converting nitrite to nitrate
    B. Fixing atmospheric nitrogen
    C. Converting ammonia to nitrite
    D. Converting nitrate to nitrogen gas
171. How do nitrogen-fixing bacteria benefit agriculture?
    A. They help to remove excess nitrogen from the soil.
    B. They fix atmospheric N_2 into a form that plants can use.
    C. They participate in the decomposition of organic matter.
    D. They convert organic nitrogen compounds into ammonia.
172. What is the source of nitrogen for ammonifying bacteria during ammonification?
    A. Atmospheric nitrogen
    B. Organic nitrogen compounds
    C. Nitrate in the soil
    D. Nitrite in the soil
173. Which bacteria are involved in the process of converting organic sulfur compounds into hydrogen sulfide during decomposition?
    A. Sulfur-fixing bacteria
    B. Sulfate-reducing bacteria
    C. Sulfur-oxidizing bacteria
    D. Sulfur-assimilating bacteria
174. Which form of sulfur is the end product of microbial oxidation in the sulfur cycle?
    A. Sulfate
    B. Elemental sulfur
    C. Hydrogen sulfide
    D. Organic sulfur compounds
175. Which microorganisms have the ability to solubilize insoluble forms of phosphorus in the soil?
    A. *Pseudomonas* and *Bacillus* species
    B. *Rhizobium* and *Azotobacter* species
    C. Nitrogen-fixing bacteria
    D. Sulfur-oxidizing bacteria
176. What is the primary objective of sterilization?
    A. Reducing microbial load in food products
    B. Killing or eliminating all forms of microbial life
    C. Killing or deactivating spoilage microorganisms
    D. Inhibiting the growth and reproduction of microbes
177. What are chemical agents used to achieve sterilization called?
    A. Sterilants
    B. Sanitizers
    C. Preservatives
    D. Disinfectants
178. Which method of moist heat sterilization involves exposing items to high-pressure steam at a temperature around 121°C or higher?
    A. Boiling
    B. Flaming
    C. Autoclaving
    D. Incineration

179. Which dry heat sterilization method involves exposing objects or instruments to an open flame and is commonly used for small, heat-resistant items?
    A. Boiling
    B. Flaming
    C. Incineration
    D. Hot air ovens
180. Which dry heat sterilization method involves the complete combustion of materials at very high temperatures, commonly used for the disposal of medical waste?
    A. Boiling
    B. Flaming
    C. Incineration
    D. Hot air ovens
181. What is one advantage of using incineration for sterilization?
    A. Slow and gradual sterilization process
    B. Introduction of moisture during the process
    C. Lower temperatures for material combustion
    D. Minimizing the need for storage and disposal space
182. What type of radiation is commonly used in radiation sterilization?
    A. Infrared radiation
    B. Ionizing radiation
    C. Ultraviolet radiation
    D. Microwave radiation
183. How does UV light sterilization work?
    A. By generating heat to kill microorganisms
    B. By damaging the DNA of microorganisms
    C. By producing toxic chemicals
    D. By creating a vacuum environment
184. Which process is more likely to eliminate bacterial endospores?
    A. Sanitization
    B. Pasteurization
    C. Disinfection
    D. Sterilization
185. Why are disinfectants used on inanimate objects and not on living tissues?
    A. They are ineffective against living tissues
    B. They cause allergic reactions in living tissues
    C. They promote tissue regeneration
    D. They can be toxic to living tissues
186. What disinfectant is added to water to kill or inactivate bacteria, viruses, and other microorganisms?
    A. Phenol
    B. Chlorine
    C. Isopropyl alcohol
    D. Hydrogen peroxide
187. When might tyndallization be preferred over autoclaving?
    A. When dealing with heat-resistant materials
    B. When rapid and complete sterilization is required
    C. When sterilizing glassware and surgical instruments
    D. When substances are sensitive to high temperatures

188. What is the primary purpose of antiseptics?
    A. Eliminating microbes on inanimate objects
    B. To eliminate or kill cancer cells inside the skin
    C. Inhibiting or destroying microbes on living tissues
    D. Disinfecting surfaces contaminated with pathogens
189. Which of the following is an example of antisepsis?
    A. Boiling food utensils used by a sick person
    B. Immersing thermometers in an isopropyl alcohol
    C. Applying a solution of 5% bleach to examining table
    D. Swabbing an open root canal with hydrogen peroxide
190. What is pasteurization primarily intended to prevent?
    A. Microbial growth in pharmaceuticals
    B. Growth of microbes causing spoilage
    C. Contamination during packaging
    D. Chemical reactions in food products
191. Which of the below terms refers to any cleansing technique that mechanically removes microorganisms (along with food debris) to reduce the level contaminats?
    A. Sanitization
    B. Disinfection
    C. Pasteurization
    D. Decontamination
192. Which parameter is not a primary consideration in determining pasteurization conditions?
    A. Microbial load
    B. Equipment type
    C. Desired shelf life
    D. Cost of production
193. What is the general term for measures taken to prevent spoilage of susceptible products?
    A. Preservation
    B. Disinfection
    C. Pasteurization
    D. Prevention
194. What is the temperature typically used in low-temperature long-time pasteurization?
    A. 71.7°C
    B. 61.5°C
    C. 150°C
    D. 85°C
195. What is the primary purpose of serial dilution in laboratory experiments?
    A. To form a diluted solution by mixing a solute with a solvent
    B. To achieve a range of concentrations from an initial solution
    C. To increase the concentration of a solution by adding a solute
    D. To prepare a relatively high concentration of a particular solute

196. Suppose you started with a bacterial culture with an initial concentration of 10,000 bacteria/mL and you performed a series of 1:10 dilutions. What would be the final concentration after 3 dilution steps?

A. 10 bacteria/mL
C. 1,000 bacteria/mL
B. 100 bacteria/mL
D. 1,250 bacteria/mL

197. What is the primary purpose of the streak plate method?

A. To obtain isolated colonies of bacteria
B. To determine bacterial concentrations
C. To observe bacterial colonies within agar
D. To mix bacterial samples with molten agar

198. What is the role of the inoculating loop in the streak plate method?

A. To measure the concentration of bacterial cultures
B. To create a deep well for bacterial growth in the agar
C. To spread bacterial colonies evenly on the agar surface
D. To collect and transfer bacterial samples to a microscope slide

199. What bacterial isolation technique is used to isolate bacteria that may be aerobic or facultative anaerobic and to observe the effects of substances added to the medium?

A. Pour plate
C. Spread plate
B. Serial plate
D. Streak plate

200. Imagine you begin with a bacterial culture having an initial concentration of $1x10^7$ bacteria/mL and undergo a sequence of 1:100 dilutions. How many dilutions would be required to reach a final concentration of $1x10^3$ bacteria/mL?

A. 2
C. 4
B. 3
D. 5

ANSWERS

1. D	41. D	81. D	121.B	161.D
2. A	42. A	82. B	122.A	162.C
3. D	43. D	83. B	123.B	163.A
4. A	44. C	84. A	124.D	164.B
5. D	45. A	85. A	125.D	165.C
6. C	46. B	86. A	126.C	166.B
7. B	47. D	87. B	127.A	167.C
8. A	48. D	88. D	128.C	168.B
9. C	49. C	89. C	129.C	169.A
10. A	50. A	90. B	130.B	170.A
11. D	51. B	91. C	131.A	171.B
12. C	52. C	92. D	132.D	172.B
13. C	53. A	93. B	133.B	173.B
14. B	54. C	94. B	134.C	174.A
15. C	55. B	95. C	135.D	175.A
16. D	56. C	96. A	136.C	176.B
17. C	57. C	97. C	137.B	177.A
18. A	58. D	98. B	138.C	178.C
19. C	59. D	99. C	139.D	179.B
20. C	60. B	100.C	140.A	180.C
21. B	61. A	101.B	141.A	181.D
22. D	62. D	102.B	142.D	182.B
23. A	63. B	103.A	143.B	183.B
24. C	64. D	104.C	144.B	184.D
25. D	65. D	105.C	145.B	185.D
26. B	66. D	106.B	146.D	186.B
27. C	67. B	107.D	147.D	187.D
28. D	68. A	108.B	148.A	188.C
29. C	69. C	109.D	149.C	189.D
30. A	70. D	110.B	150.A	190.B
31. C	71. C	111.C	151.C	191.A
32. B	72. B	112.C	152.C	192.D
33. C	73. D	113.B	153.D	193.A
34. D	74. B	114.A	154.C	194.B
35. B	75. B	115.A	155.D	195.B
36. D	76. C	116.A	156.A	196.A
37. D	77. A	117.A	157.D	197.A
38. D	78. C	118.B	158.C	198.C
39. A	79. C	119.A	159.B	199.A
40. C	80. B	120.B	160.B	200.A