KWAME NKRUMAH UNIVERSITY OF SCIENCE & TECHNOLOGY

COLLEGE OF SCIENCE

B.Sc. (Biol. Sc./ Environ. Sci.) (O.D./Optom.) Second Semester Examinations, 2014

Second Year

BIOL 252 MICROBIAL ECOLOGY

APRIL, 2014 TWO HOURS

INDEX NUMBER.....

PROGRAMME OF STUDY: .....

Answer ALL questions. Please shade the correct answer on the scannable form and circle on the question paper

1. Which one of the following impurities is easiest to remove from wastewater
   a. Bacteria
   b. Colloids
   c. Dissolved solids
   d. Suspended solids

2. The green scum seen in freshwater bodies is
   a. Blue green algae
   b. Red algae
   c. Green algae
   d. Both a and c

3. Which of the following material takes the longest time for biodegradation
   a. Cotton
   b. Paper
   c. Bone
   d. Jute

4. Non-biodegradable nutrients are created by
   a. Nature
   b. Excessive use of resources
   c. Humans
   d. Natural disasters

5. For disinfection purposes chlorine is added to the ..... effluent
   a. Secondary clarifier
   b. Sludge digester
   c. Trickling filter
   d. Rotating biological contactors
   e. Aeration tank

6. A wastewater treatment plant may dispose of effluent by
   a. Discharging onto land
   b. Evaporating into the atmosphere
   c. Discharging into receiving waters
   d. Reclaiming and reusing
   e. All of the above

7. An organism has an optimal growth rate when the hydrogen ion concentration is very high. This organisms is a(n)
   a. Osmotolerant
   b. Acidophile
   c. Aerotolerant anaerobe
   d. Alkaliphile

8. The term facultative anaerobe refers to an organism that
   a. Doesn't use oxygen but tolerates it
   b. Is killed by oxygen
   c. Uses oxygen when present or grows without oxygen when oxygen is absent
   d. Requires less oxygen than is present in the air

9. The term obligate anaerobe refers to an organism that
   a. Doesn't use oxygen but tolerates it
   b. Is killed by oxygen
   c. Uses oxygen when present or grows without oxygen when oxygen is absent
   d. Requires less oxygen than is present in the air

10. The term aerotolerant anaerobe refers to an organism that
   a. Doesn't use oxygen but can grow in the presence of oxygen
   b. Is killed by oxygen
   c. Uses oxygen when present or grows without oxygen when oxygen is absent
   d. Requires less oxygen than is present

11. Which of the following does **not** kill endospores
   a. Autoclave
   b. Incineration
   c. Hot air sterilization
   d. Pasteurization

12. Sweet and salty foods frequently do not require refrigeration to prevent spoilage beca they have
   a. Insufficient nutrients
   b. Low pH

c. High concentration of solutes
d. Toxic alkaline chemicals

13. Which of the following is a limitation of the autoclave
a. It takes too long to sterilize
b. It lacks the ability to inactivate viruses
c. It lacks the ability to kill endospores
d. It will destroy heat labile materials

14. Which of the following is best used for long term storage of microbial samples
a. Storage in a freezer at -10°C
b. Storage in a freezer at ultra low temperatures -70°C
c. Storage in a refrigerator on an agar slant
d. Storage on a Petri plate at room temperature

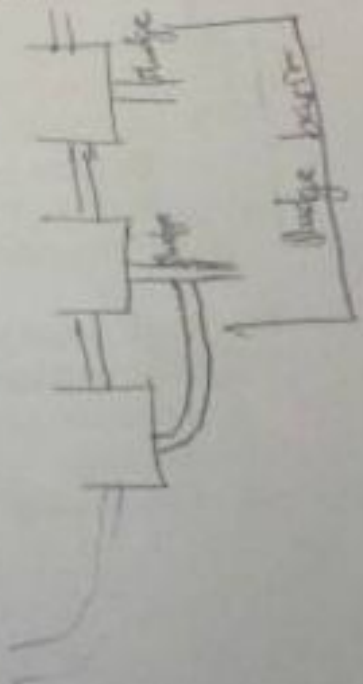
15. Methanogens are potentially of great importance because
a. They produce methane
b. They consume methane
c. Methane is an excellent energy source
d. Both a and c

Match the types of wastewater treatment listed in the following questions with the following processes. Choices may be used once, more than once or not at all

Primary treatment, secondary treatment, tertiary treatment

16. Removal of solids
a. Primary treatment
b. tertiary treatment
c. secondary treatment
d. None of these

17. Activated sludge
a. Primary treatment
b. tertiary treatment
c. secondary treatment
d. None of these



18. Chemical precipitation of phosphorus
a. Primary treatment
b. tertiary treatment
c. secondary treatment
d. None of these

19. Trickling filter
a. Primary treatment
b. tertiary treatment
c. secondary treatment
d. None of these

Pcu/Coe/

In the next set of questions we are concerned with the sewage treatment p... The primary treatment processes are to be considered groups I. The secondary treatment processes are to be considered group II.

20. Removal of solids
a. A reaction of I but not II
b. A reaction of II but not I
c. A reaction of both I and II
d. Not a reaction of both I and II but necessary if either I or II or both are to occur

21. Aerobic digestion of dissolved organic material
a. A reaction of I but not II
b. A reaction of II but not I
c. A reaction of both I and II
d. Not a reaction of both I and II but necessary if either I or II or both are to occur

22. Incorporation of dissolved phosphates into algae
a. A reaction of I but not II
b. A reaction of II but not I
c. A reaction of both I and II
d. Not a reaction of either I and II but occurs as a result of I or II or both

23. Anaerobic sludge digestion
a. A reaction of I but not II
b. A reaction of II but not I
c. A reaction of both I and II
d. Not a reaction of either I and II but occurs as a result of I or II or both

24. Removal of stones and sand
a. A reaction of I but not II
b. A reaction of II but not I
c. A reaction of both I and II
d. Not a reaction of either I and II but necessary if either I or II or both are

25. In relation to bacterium's optimal growth requirement, which group would be MOST likely in decomposition of compost piles
a. Acidophiles
b. Extreme halophiles
c. Psychrophiles
d. Thermophiles

26. Which genus of bacteria contributes to dental plagues
a. *Streptococcus*
b. *Staphylococcus*
c. *Bacillus*
d. *Escherichia*

27. The stomach usually contains a very low concentration of bacteria due to
a. the high pH
b. the low pH
c. the neutral pH
d. the inhibitory action of the bile

28. The bladder of adult females is normally colonized by
a. *Lactobacillus*
b. *Staphylococcus epidermis*
c. *Streptococcus*
d. The bladder is normally sterile

29. A catheter is inserted into the
a. Bladder
b. Kidney
c. Ureter
d. Urethra

30. Silage is
a. Human waste
b. Lactic acid
c. Livestock feed
d. Spoiled milk

31. Select the bacterium that causes human disease but is not found commonly in the soil
a. *Clostridium botulinum*
b. *Clostridium tetani*
c. *Pseudomonas aeruginosa*
d. *Staphylococcus aureus*

32. *Legionella pneumophila* is usually transmitted by
a. Direct contact
b. Fomites
c. Aerosols
d. Blood

33. Most tertiary treatments of water are
a. Biological
b. Chemical
c. Enzymatic
d. Mechanical

34. A procedure that allows a laboratory worker to properly handle microbes safely is
a. Sterilization
b. Aseptic techniques
c. Disinfection
d. Antisepsis

35. A partially filled coffee cup including milk and sugar is left standing [illegible] becomes contaminated. This is an example of
   a. Fomite transmission
   b. Direct transmission
   c. Reservoir of infection
   d. All of these

36. The most important procedure for preventing the transmission of a microbe in the clinical area is
   a. Covering coughs and sneezes
   b. Hand washing
   c. Use of air filtration
   d. Elimination of the portal of entry

37. A restaurant worker is polishing silverware with a towel just used to wipe down a dirty tabletop. The silverware is now a
   a. Vector
   b. Reservoir of infection
   c. Fomite
   d. Portal of entry

38. Which of the following bacterial groups would you expect to be MOST likely associated with human infections
   a. thermophiles
   b. psychrophiles
   c. lactophiles
   d. mesophiles

39. The majority of microbes on the surface of the human skin are
   a. Gram-positive bacteria
   b. Gram-negative bacteria
   c. Spore forming bacteria
   d. Enteric

40. A living microbe with reduced virulence that is used for vaccination is considered
   a. A toxoid
   b. Denatured
   c. Dormant
   d. Attenuated

41. Which of the following respiratory infections cannot be treated with antimicrobial
   a. Tuberculosis
   b. Otitis media
   c. Common cold
   d. A typical pneumonia

42. Soil microorganism that are also potential pathogens for humans and other animals are most likely to be members of the genus
   a. Thiobacillus
   b. Rhizobium
   c. Clostridium
   d. Azotobacter

43. The Biological oxygen demand (BOD) would be most directly affected by the presence of which of the following pollutants
   a. Heavy metals
   b. Organic wastes
   c. Waste minerals from mining
   d. Fertilizer runoff from farms

44. The microbe that is mainly used as an indicator of faecal pollution in water is
   a. *Escherichia coli*
   b. *Clostridium tetani*
   c. *Clostridium botulinum*
   d. Cyanobacteria

45. A nurse prepares an area of skin for injection by scrubbing it with alcohol swab; this is a process called
   a. Disinfection
   b. Sanitization
   c. Sterilization
   d. Degerming

46. Which statement about tolerance limits is **incorrect**
   a. They can often be tested experimentally and plotted as a tolerance curve
   b. They help determine whether organisms can live in particular environments
   c. They can be extended by acclimation in some cases
   d. They are generally greatest for organisms restricted to stable environments

47. Routinely results in drinking water
   a. Primary treatment
   b. Secondary treatment
   c. Tertiary treatment
   d. None of these

48. All of the following microorganisms are considered coliforms EXCEPT
   a. *Enterobacter aerogenes*
   b. *Salmonella typhi*
   c. *Klebsiella pneumoniae*
   d. *Escherichia coli*

49. Faecal coliforms differ from coliforms by virtue of
    a. The ability of faecal coliforms to ferment lactose within 48 hrs and coli... cannot
    b. Fact that faecal coliforms are gram positive rods and coliforms are gram nega... rods
    c. Are derived from warm blooded animals and can grow at 44.5°C
    d. Fact that faecal coliforms are facultatively anaerobic whereas coliforms are obligate anaerobes

50. I: The BOD of wastewater after the tertiary stage in treatment
    II: The BOD of wastewater after the Primary stage in treatment
    a. I is greater than II
    b. II is greater than I
    c. I is exactly approximately equal to II
    d. I may stand in more than one of the above relations to II

51. Coliforms are used as indicator organisms because
    I: they are present wherever enteric pathogens are present
    II: a testing procedure with great specificity is easy to perform
    a. I only is true
    b. II only is true
    c. Both I and II a true
    d. Neither I nor II are rue

52. An obligatory association between two different species that is beneficial to both populations of organisms is
    a. Parasitic
    b. Predatory
    c. Symbiotic
    d. Mutualisic

53. Which genus of bacteria contributes to plague, caries, gingivitis and periodontal dise...
    a. *Streptococcus*
    b. *Staphylococcus*
    c. *Bacillus*
    d. *Escherichia*

54. Passive immunization is routinely administered to individuals exposed to certain microbial pathogens that cause disease EXCEPT
    a. Botulism
    b. Diphtheria
    c. Hepatitis
    d. Chicken pox

55. Which of the following DOES NOT represent direct contact from host-to-host
    a. Coughing
    b. Sneezing
    c. Body contact
    d. Shedding onto surfaces

56. Which of the following represents a passive mechanism by which a bacteria can penetrate a host
   a. Attacking the intestinal linings
   b. Degrading carbohydrate-protein complexes
   c. Disrupting the cell surface
   d. Tissue damage caused by other organisms

57. A patient has some destruction of the enamel covering the teeth. This is probably caused by the activity of
   a. *B. subtilis*
   b. *H. pylori*
   c. *S. aureus*
   d. *S. mutans*

58. A patient has the symptoms of diarrhea, nausea, vomiting and cramps from abdominal pain. This patient probably suffers from
   a. Gastroenteritis
   b. Peristalsis
   c. Parotitis
   d. Pleurisy

59. Stomach ulcers are caused by a species of
   a. *Bacillus*
   b. *Escherichia*
   c. *Helicobacter*
   d. *Staphylococcus*

60. A pathogen must have a reservoir in order to
   a. Attach to a substrate
   b. Gain a food source
   c. Overcome the action of antibiotics
   d. Survive outside the human host

61. Almost any ..... can be a reservoir of rabies
   a. Bird
   b. Fish
   c. Reptile
   d. Wild mammal

62. Rabies attacks the human..... System
   a. Endocrine
   b. Nervous
   c. Skeletal
   d. Urinary

63. Select the incorrect statement about *Bifidobacterium* species in the human body
   a. They are favoured to grow in the presence of bifidus
   b. They ferment sugars to acetic acid
   c. They ferment sugars to lactic acid

d. They inhibit infant health

64. A researcher plans to inhibit the growth of a halophile. This can be done by u
growth medium
a. 5% NaCl
b. 14% NaCl
c. 25 degrees C
d. 37 degrees C

65. *Fusobacterium periodonticum* is found in the ..... of humans
a. Blood
b. Oral cavity
c. Reproductive tract
d. Urinary tract

66. Select the wavelength of UV light that is most effective at damaging the DNA
microorganisms
a. 150
b. 275
c. 350
d. 500

67. Select the incorrect statement about using UV light to kill microorganisms
a. It can penetrate glass
b. It has wavelength shorter than visible light
c. It is lethal to microbes
d. It presents a health hazard to humans

68. Select the microorganism that cannot be removed from a liquid medium by fi
a. Alga
b. Bacterium
c. Protozoan
d. Virus

69. Alkaliphiles grow best at a pH of
a. 1
b. 5
c. 7
d. 9

70. Visible wavelength of light are in the range of ..... Nanometers
a. 100 to 300
b. 400 to 700
c. 800 to 1000
d. 1100 to 1400

71. Bacteria can live at temperature extremes that vary as much as ..... degrees C
   a. 40 to 60
   b. 20 to 80
   c. 0 to 100
   (d) -20 to 110

72. All of the following can be transmitted through recreational (i.e. swimming) water sources EXCEPT
   a. Amoebic dysentery
   b. Cholera
   c. Giardiasis
   (d) Hepatitis B
   e. Salmonellosis

73. A patient with nausea, vomiting and diarrhea within 5 hours after eating most likely has
   a. Shigellosis
   (b) Cholera
   c. *E. coli* gastroenteritis
   d. Salmonellosis
   e. *Staphylococcus food poisoning*

74. Isolation of *E. coli* from a stool sample is diagnostic proof that the patient has
   a. Cholera
   (b) *E. coli* gastroenteritis
   c. Salmonellosis
   d. Typhoid fever
   e. None of the above

75. Microscopic examination of a patient's faecal culture shows comma-shaped bacteria. These bacteria require 2-4% NaCl to grow. The bacteria probably belong to the genus
   a. *Campylobacter*
   b. *Escherichia*
   c. *Salmonella*
   d. *Shigella*
   (e) *Vibrio*

76. A cholera epidemic in Peru had all of the following characteristics. Which one led to others?
   a. Eating raw fish
   (b) Sewage contamination of water
   c. Catching fish in contaminated water
   d. Vibrio in fish intestine
   e. Including fish intestines with edibles

77. Identification is based on the observation of oocysts in faeces
   a. *Campylobacter*
   (b) *Cryptosporidium*
   c. *Escherichia*
   d. *Salmonella*

Pcu

e. *Trichinella*

78. A characteristic diarrheic symptom caused by this microorganism is swelling around the eyes
a. *Campylobacter*
b. *Cryptosporidium*
c. *Escherichia*
d. *Salmonella*
e. *Trichinella*

79. Microscopic observation of a stool sample reveals gram-negative helical cells
a. *Campylobacter*
b. *Cryptosporidium*
c. *Escherichia*
d. *Salmonella*
e. *Trichinella*

80. The microbe is frequently transmitted to humans via raw eggs
a. *Campylobacter*
b. *Cryptosporidium*
c. *Escherichia*
d. *Salmonella*
e. *Trichinella*

81. Microscopic examination of vaginal smear shows gram-negative cocci in phagocytes
a. *Candida* – (
b. *Chlamydia*
c. *Gardnerella* – (
d. *Neisseria*
e. *Trichomonas* – (

82. Methane production
a. The process takes place under aerobic conditions
b. The process takes place under anaerobic conditions
c. The amount of oxygen doesn't make any difference
d. The process takes place under microaerophilic conditions

83. The water used to prepare intravenous solutions in a hospital contained endotoxins. Infection control personnel performed plate counts to find the source of the bacteria. The results were:

	Bacteria/100ml
Municipal water pipes	0
Boiler	0
Hot water line	300

All of the following conclusions about the bacteria can be drawn EXCEPT which one

a. It was present as a biofilm in the pipes

b. It is gram-negative
c. It comes from faecal contamination
d. It comes from the city water supply
e. None of the above

84. All of the following are effects of water pollution EXCEPT
a. The spread of infectious diseases
b. Increased eutrophication
c. Increased BOD
d. Increased growth of algae
e. None of the above

85. Coliforms are used as indicator organisms of sewage pollution because
a. They are pathogens
b. They ferment lactose
c. They are abundant in human intestines
d. They grow within 48 hours
e. All of the above

86. A disease that affects both the bone and tissue surrounding the teeth is called
a. Dental caries
b. Plague
c. Periodontitis
d. Gingivitis

87. Which of the following bacteria convert sucrose to glucose polymers such as dextran which aid in formation of dental plague
a. *Escherichia coli*
b. *Streptococcus mutans*
c. *Staphylococcus aureus*
d. *Streptococcus pyogenes*

88. Which of the following statements is the best definition of a pandemic disease
a. It normally occurs in a given geographic area
b. It is a disease that occurs more frequently than usual for a geographical area or group of people
c. It occurs infrequently at no predictable time scattered over a large area or population
d. It is an epidemic that occurs on more than one continent at the same time

89. *Salmonella typhi* has the ability to persist within the gall bladder of humans while causi
no clinical symptoms. The infected individual is still contagious, however, and would
considered a
a. Pathogen
b. Endemic
c. Carrier
d. Nuisance

90. A marked decrease in BOD during secondary treatment indicates
   a. A lack of oxidation during treatment
   b. Effective aerobic decomposition during treatment
   c. Effective anaerobic decomposition during treatment
   d. Removal of all pathogenic bacteria
   e. Removal of all toxic chemicals

91. Advanced treatment is often designed to remove
   a. BOD
   b. Nitrates and Phosphates
   c. Bacteria
   d. Protozoa
   e. Methane

92. Which of the following pairs DOES NOT match
   a. Potable water – presence of pathogens
   b. High BOD – high organic content
   c. Stabilized sludge – fertilizer
   d. Primary treatment – removal of materials that settle
   e. Bulking – growth of filamentous bacteria

93. Which of the following is FALSE
   a. Bulking interferes with trickling filter systems
   b. Artificial wetlands provide a habitat for wildlife
   c. Removal of nitrates by microorganisms requires anaerobic conditions
   d. Methane is a by-product of anaerobic digestion

94. Which of the following pairs does NOT match
   a. Surface water – watershed
   b. Groundwater – aquifer
   c. Sand and gravel filters – removes organic chemicals
   d. Alum – causes suspended materials to coagulate
   e. Disinfection – chlorine, ozone, or ultraviolet light

95. Septic tanks should be placed
   a. As close to the well as possible
   b. At least 500 feet from the house
   c. Under the house
   d. In deep clay soil
   e. Where the overflow cannot contaminate any water supply

96. Which of the following statement about coliforms testing methods is TRUE
   a. All determine the number of *E. coli* present in a sample
   b. The MPN procedure precisely indicates the concentration of coliforms
   c. The media employed test for the ability to ferment lactose
   d. A positive test indicates that pathogens are definitely present in the sample
   e. All coliforms hydrolyze ONPG and MUG

97. Landfills are often used to dispose of
a. Household wastewater
b. Commercial waste
c. Solid waste
d. Petroleum waste
e. Wastewater effluent

98. Backyard composting is an excellent way to dispose of
a. Cooking fat
b. Garden debris
c. Spoiled meat
d. Insecticides
e. Cleaning supplies

99. Synthetic compounds are most likely to be biodegradable if they
a. Are totally different from anything found in nature
b. Have three chlorine atoms per molecule
c. Are plastics
d. Are present in very large amounts
e. Are chemically similar to naturally occurring substances

100. Inflammation of the eye conjunctiva (bacterial conjunctivitis) can be caused by
a. *Staphylococcus aureus*
b. *Neisseria gonorrhoeae*
c. *Pseudomonas aeruginosa*
d. All of these

101. Which of the following is not an example of a biofilm
a. A single bacterial cell growing on an agar plate
b. Human normal flora
c. Toilet bowl scum
d. Organisms that colonize indwellings of medical devices
e. Dental plague

102. Which of the following is not a method of microbial control used in times
a. Salting, smoking, pickling and drying
b. Exposing food, clothing and bedding to sunlight
c. Boiling water
d. Consuming moulds to derive antibiotic benefit
e. Burying human waste

103. What term is defined as a chemical agent that is applied directly to body surfac wounds, and surgical inclusions to destroy or inhibit vegetative pathogens
a. A bacteriostatic agent
b. Fungicide
c. Disinfectant
d. Sanitizer
e. Antiseptic

104. What is the most widely used of the physical methods of microbial control
a. Filtration
b. Heat
c. Radiation
d. Cold
e. Ultrasonic waves

105. Pasteurization rids liquids of what microbial form
a. Endospores
b. Thermoduric organisms
c. Nonpathogenic lactobacilli
d. Nonpathogenic micrococci
e. Most viruses and vegetative stages of 97-99% of bacteria and fungi

106. What microbes were used in the Senate's Hart Office building to ensure that fumigation and cleanup of *Bacillus anthracis* endospores was successful
a. Escherichia coli
b. Staphylococcus aureus
c. Protozoan cysts
d. Bacillus stearothermophilus
e. Fungal spores

107. The human body provides favourable habitat for microorganisms. Which of following does not contribute to this favourable habitat
a. Stable temperature
b. Extensive surface upon which to colonize
c. Constant source of nourishment
d. Low levels of moisture
e. Relatively stable pH

108. Why are human bites especially dangerous
a. Because the oral cavity and saliva contains high levels of bacteria
b. Because saliva contains lysosome
c. Because human teeth are extremely sharp
d. Because normal flora of the mouth are pathogenic
e. Because the protozoa that reside in the moth are harmful when transferred to others

109. The greatest number of pathogens use what as a portal of entry
a. Skin
b. Gastrointestinal tract
c. Respiratory tract
d. Urogenital tract
e. Transplancental

110. Which of the following is not a reservoir
a. Vectors
b. Humans
c. Animals

d. Soil
e. Water

111. A/an ____ is defined as a collection of populations sharing a given habitat
a. Biosphere
b. Biome
c. Community
d. Ecosystem
e. House

112. When water comes into contact with metal piping and oxygen is introduced, microorganisms attach themselves to the metal surface and form a biofilm composed of bacteria, algae and other microorganisms. This type of corrosion is called
a. Metal Induced Corrosion
b. Mettalurgically Influenced Corrosion
c. Microbiologically Induced Corrosion
d. Microbiologically Influenced Corrosion
e. Microbiologically Indexed Corrosion

113. Biofilm formation in pipes is now being extensively controlled in many commonwealth countries using
a. A Non-metallic materials BS 6920
b. A non-metallic material UK 6920
c. A non-metallic material UK 6699
d. A non-metallic material BS 2090
e. A non-metallic material BS 6090

114. Domestic wastewater is a combination of
a. Yellow water, brown water and black water
b. Grey water, brown water, yellow water
c. Black water, yellow water, brown water and greywater
d. Urine water, flush water and greywater
e. Black, water, blue water and brown water

115. Name THREE sanitation technology options available in Ghana but internationally unacceptable
a. Pit latrine, Open defaecation, Flush toilets
b. Open defaecation, Pit latrine, Pan latrine
c. Pan latrine, Aqua privy, KVIP
d. Menu sack, Water Closet, Pan latrine
e. KVIP, Menu sack, Aqua Privy

116. A laboratory test for an isolate from a skin wound comes out to be gram positive cocci in clusters, catalase positive, facultative anaerobe, salt tolerant and a protein A positive. Which bacterial species likely has the same characteristics as the bacteria isolated
a. *Bacillus subtilis*
b. *Escherichia coli*

c. *Staphylococcus aureus*
d. *Streptococcus pyrogenes*
e. *Pseudomonas aeruginosa*

117. Of the following genera, which can survive the hardest conditions
a. *Staphylococcus*
b. *Mycobacterium*
c. *Clostridium*
d. *Actinomyces*

118. People cannot contract viral diseases from their pets because
a. People have stronger immune system than their pets
b. Once the virus is in the host, it doesn't leave
c. The virus is specific for a given host
d. The virus kills the pet before a person can contract it
e. Viruses do not affect people

119. A particularly severe form of food poisoning is caused by..... bacterium that has developed resistance to antibiotics
a. *Plasmodium*
b. *Streptococcus*
c. Sarcodines
d. HIV
e. *Salmonella*

120. Why are oil spills sprayed with bacterial cultures
a. To kill the bacteria
b. To make the oil easier to wash away
c. To eat the oil
d. To prevent the oil from sticking to wildlife
e. To detoxify the oil

121. In which of these situations would you find bacteria
a. Intestinal tract
b. Polar ice caps
c. Deep sea vents
d. Mud puddle
e. All of these

122. Which of these is not caused by bacteria
a. Strep throat
b. Tetanus
c. Botulism
d. Lyme disease
e. Rabies

123. A complex interrelated network of organisms and the surrounding abiotic environment in a defined area is a(n)
a. Community
b. Ecosystem
c. Population
d. Biosphere
e. Biome

124. A major ecological concern, the Greenhouse Effect, is caused by
a. The release of heat energy from burning fossil fuels
b. The release of carbon dioxide from the burning of wood, coal, and oil
c. The destruction of ozone in the upper atmosphere
d. Overuse of fertilizers in farming
e. Global warming

125. A bacterial disease that has been associated with the 3"Rs" i.e. rats, rice fields and rainfall is
a. Leptospirosis
b. Plague
c. Melioidosis
d. Rodent bite fever
e. Campylobacter

126. The final effluent from sewage plants is treated with .....gas
a. Ethylene
b. Chlorine
c. Ozone
d. Methane
e. Charcoal

127. By the process of mineralization microorganisms convert .....materials to.....materials
a. Inorganic to organic
b. Organic to inorganic
c. Organotrophs to autotrophs
d. Microbes to soil
e. Water from soil

128. Bacterial endospores are resistant to
a. Heat
b. UV radiation
c. Chemical disinfectants
d. Antibiotics
e. All of the above except d

129. Which type of *E. coli* is the most common cause of Travellers diarrhea
a. Enteropathogenic E. coli
b. Enterotoxigenic E. coli
c. Verotoxigenic E. coli

d. Enteroinvasive E. coli
e. Contusive E. coli

130. A process that uses naturally occurring or genetically engineered microorganisms to transform harmful substances into less toxic or nontoxic compounds
a. Bioremediation
b. Bioconversion
c. Biostimulation
d. Bioconglumeration
e. Bioaggregation

131. Pertussis is
a. Pneumonia
b. Scarlet fever
c. Whooping cough
d. Yellow fever

132. Rubella is a
a. Bacterium
b. Fungus
c. Protozoan
d. Virus

133. Choose the odd pair out
a. Meningitis ..... *Bordetella pertussis*
b. Diphteria ..... *Corynebacterium diphtheriae*
c. Pneumonia ..... *Mycoplasma pneumoniae*
d. Whooping cough .....*Neisseria species*
e. Tuberculosis..... *Mycobacterium tuberculosis*

a. a only
b. a and e
c. All of the above except d
d. a and d
e. e only

134. The MMR vaccine is a vaccine against which of the following three diseases?
a. Chicken pox, Measles and German measles
b. Chicken pox, flu and mumps
c. Mumps, Measles and Rubella
d. German measles, Measles and Rubella
e. Measles, smallpox and measles

135. The Varicella virus is the causative agent of which disease?
a. Small pox
b. Chicken pox
c. Measles
d. Common cold
e. Common pox

136. All these are examples of waterborne diseases EXCEPT
a. Typhoid
b. Cholera
c. Shigellosis
d. Cryptosporidiosis
e. Measles

137. Which of the following will result in a waterborne disease
a. Faeces of A - Fingers of A – Mouth of A
b. Faeces of A - Fingers of A – Fingers of B - Mouth of B
c. Faeces of A - Fingers of A – Food - Mouth of B, C
d. Faeces of A - Fingers of A – Food - Mouth of D, E
e. Faeces of A – Water - Mouth of B,C

138. If waterborne diseases are actually are more commonly water washed then improvements in water quantity will have greater health impact and so be more cost effective than improvements in quality.
a. True
b. False
c. Not sure
d. Both are true
e. Both are false

139. Trachoma, the world's leading cause of preventable blindness is caused by
a. Chlamydia trichomatis
b. Herpes simplex
c. Neisseria gonorrhoeae
d. Acanthamoeba
e. All of these

140. Which of the following is added during water or sewage treatment to promote flocculation
a. Sludge
b. BOD
c. Alum
d. PHA
e. PCB

141. During chemical treatment of drinking water and wastewater which of the following microbes is **least** likely to be inactivated or killed
a. Algae
b. Bacterial endospores
c. Fungal spores
d. Viruses
e. Blue Green algae

142. In which step is most of the organic content of sewage removed
a. Primary treatment
b. Secondary treatment
c. Tertiary treatment
d. Sludge treatment
e. Pre-primary treatment

143. Microbial communities are composed of
a. Single, pure populations
b. Mixed populations of competing organisms
c. Mixed populations of cooperating organisms
d. A biosphere
e. A complex

144. Of the following characteristics which would contribute most to making a microorganism an effective biological warfare agent
a. Is readily available in the environment
b. Can be spread by contact after original dissemination
c. Cannot be treated well outside of a hospital
d. Is easily identified by symptoms

145. Many people refer to tetanus infection with the pathogen *Clostridium tetani* as lockjaw. Which of the following best explains why
a. These bacteria produce a capsule that hardens the surface of the jaw
b. These bacteria produce a toxin that causes jaw muscle to remain contracted
c. These bacteria accumulate in the jaw and prevent proper jaw movement
d. These bacteria produce an enzyme that breaks apart jaw muscle cells

146. Reservoirs for pathogens include
a. Humans
b. Animals
c. Nonliving environments
d. Carriers
e. All of the above

147. Zoonotic diseases occur after direct contact with all of the following except
a. Animal feed
b. Soiled litter box
c. Feathers
d. Fur
e. Bite of rabid animal

148. Nonliving reservoirs include all of the following except
a. Food
b. Water
c. Blood
d. Soil

149. Which of the following is not a type of contact transmission
a. Droplet
b. Indirect
c. Direct
d. Nosocomial

150. HIV transmitted by a contaminated needle is an example of
a. Direct contact transmission
b. Droplet contact transmission
c. Indirect contact transmission
d. Vector transmission

151. We refer to nonliving intermediates used in disease transmission as
a. Vectors
b. Fomites
c. Nosocomial agents
d. Zoonotic agents

152. Examples of vehicles for disease transmission include
a. Water
b. Air
c. Blood
d. Intravenous fluids
e. All of the above

153. Likely sources of nosocomial infections include all of the following except
a. Catheters
b. Nebulizers
c. Bed sheets
d. Humidifiers
e. Contaminated needles

154. The number of new cases of a disease contracted within a set population i
specific period is the definition of
a. Prevalence
b. Mortality rate
c. Morbidity rate
d. Incidence
e. None of the above

155. Disease that are constantly in a population are called
a. Epidemic
b. Pandemic
c. Sporadic
d. Endemic
e. None of the above

156. All of the following are emerging infectious diseases except
a. Creutzfeldt-jacob disease
b. Legionnaires disease
c. Mumps
d. SARS
e. Hepatitis C

157. The Nipah virus originated in
a. Pigs
b. Chickens
c. Fruit bats
d. Monkeys
e. Rats

158. Which of the following has achieved the ability to be transmissible from one human to another
a. Nipah virus
b. HIV
c. SARS
d. Hantavirus
e. B and C

159. All of the following are involved in antibiotic resistance except
a. Travel
b. Overuse of antibiotics
c. Specific prescription of antibiotics
d. Improper use of antibiotics
e. None of the above

160. MRSA stands for which of the following
a. Microbial-resistant *Streptococcus aureus*
b. Microbial-resistant *Staphylococcus aureus*
c. Methicillin-reactive *Staphylococcus aureus*
d. Methicillin-resistant *Staphylococcus aureus*

161. MRSA organisms are resistant to which of the following
a. Penicillin
b. Cephalosporins
c. Carbapenems
d. None of the above
e. All of the above

162. Dental plague is an example of
a. A pellicle
b. A biofilm
c. Gingivitis
d. Trench mouth
e. All of the above

163. An oxidation pond is located after the
a. The primary clarifier
b. The secondary clarifier
c. The trickling filter
d. None of the above

164. What does ACTIVATED SLUDGE process mean
a. Activated air is used in the process
b. The plant must be activated before the wastewater is treated
c. Activated carbon is used in the process
d. The sludge particles are teeming with bacteria, fungi and protozoa
e. The microorganisms must be activated before they start treating the wastewater

165. Rotating Biological Contactors are usually covered to
a. Protect biological slime growth from freezing
b. Prevent growth of algae on the media
c. Prevent intense rains from washing some of the slime off the media
d. All of the above

166. What best measures the efficiency of a Trickling Filter
a. BOD
b. pH
c. sludge age
d. temperature
e. total solids

167. Sludge digesters that are used today
a. Produce gas that can be used elsewhere in the plant
b. Are sealed tanks
c. Depend on the action of anaerobic bacteria
d. Require approximately 30 days to produce a properly digested sludge
e. All of the above

168. A community used water and water carried solids that flow to treatment plant are called
a. Effluent
b. Wastewater
c. Mixed liquor
d. Sludge
e. None of these

169. Which of the following is not a major source of groundwater contamination
a. Agricultural products
b. Landfills
c. Septic tanks
d. Underground storage tanks
e. All of the above

170. Which of the following are an example of municipal and industrial discharges from pipes
a. Non-point sources of pollution
b. Violation of the Clean Water Act
c. Point-sources of pollution
d. Irrigation
e. None of the above

171. The most serious environmental effect posed by hazardous waste is
a. Air pollution
b. Contamination of ground water
c. Increased use of land for landfills
d. Destruction of habitats
e. None of the above

172. Which of the following is a prime health risks associated with greater UV radiation through the atmosphere due to depletion of the stratosphere ozone
a. Damaged digestive system
b. Increased liver cancer
c. Neurological disorder
d. Increased skin cancer

173. Blindness is a recognized complication of
a. Leprosy
b. Onchocerciasis
c. Vitamin C deficiency
d. Toxoplasmosis

174. Which of the following waste cannot be decomposed by bacteria to form compos
a. Kitchen waste
b. Plastic and polythene bags
c. Dead plants
d. Bodies of insects living in the soil

175. 71% of the earth surface is covered with
a. Land
b. Air
c. Water
d. Coal

176. Which of the following diseases is not due to contaminated water
a. Hepatitis B
b. Jaundice
c. Cholera
d. Typhoid

177. A marked decrease in BOD during secondary treatment indicates
a. Lack of oxidation during treatment
b. Effective aerobic decomposition during treatment

c. Effective anaerobic decomposition during treatment
d. Removal of all pathogenic bacteria
e. Removal of all toxic chemicals

178. Advanced treatment is often designed to remove
a. BOD
b. Nitrates and phosphates
c. Bacteria
d. Protozoa
e. Methane

179. Which of the following is an example of a fomite
a. Table
b. Flea
c. *Staphylococcus aureus* carrier
d. Water
e. Air

180. Which of the following would be easiest to eradicate
a. A pathogen that is common in wild animals but sometimes infect humans
b. A disease that occurs exclusively in humans, always resulting in obvious symptoms
c. A mild disease of humans that often results in no obvious symptoms
d. A pathogen found in marine sediments
e. A pathogen that readily infects both wild animals and humans

181. Which of the following methods of disease transmission is the most difficult to control
a. Airborne
b. Food-borne
c. Waterborne
d. Vector-borne
e. Direct person to person

182. Which of the following statements is false
a. A botulism epidemic that results from improperly canned green beans is an example of a common source outbreak
b. Droplet nuclei fall quickly to the ground
c. Congenital syphilis is an example of a disease acquired through vertical transmission
d. Plague is endemic in the prairie dog population in parts of the United States
e. The first case in an outbreak is called the index case

183. Which of the following statements is FALSE
a. A disease with a long incubation period might spread extensively before an epidemic is recognized
b. A person exposed to a low dose of a pathogen might not develop disease
c. The young and the aged are more likely to develop certain disease
d. Malnourished populations are more likely to develop certain disease