In the next set of questions we are concerned with the sewage treatment process. The primary treatment processes are to be considered group 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 to occur

25. In relation to bacterium's optimal growth requirement, which group would you expect to 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*

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 because they have
   a. Insufficient nutrients
   b. Low pH

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND 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 also 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

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

ANSWER ALL QUESTIONS

1. Gamma rays and X rays are effective in killing microorganisms because they

a. Dislodge electrons from atoms, creating ions
b. Damage DNA
c. Produce powerful oxidizing agents (peroxides)
d. All of these
e. None of these

2. Heat sensitivity (rubber and plastics) and bulky materials (mattresses) can be sterilized using

a. Dry heat
b. Autoclaving
c. UV radiation
d. Gaseous ethylene oxide
e. None of these

3. Mucous secreting membranes are found in the

a. Urinary system
b. Digestive system
c. Respiratory passages
d. All of the above

4. All the following are true about releasing untreated sewage into river except

a. It is a health hazard
b. It increases the BOD
c. It decreases the dissolved oxygen

a. I is greater than II
b. II is greater than I
c. I is exactly or approximately equal to II
d. I may stand in more than one of the above relations to II

10. The Mad Hatter of Lewis Carroll's Alice in Wonderland and the poisoning symptom Minamata Bay are linked by toxicity to which of the

a. Manganese
b. Magnesium
c. Mercury
d. Molybdenum
e. Iron

For the next set of questions, compare the validity of two statements

11. Ruminant organisms include
I – obligate aerobes
II – anaerobic fungi

a. I only is true
b. II only is true
c. Both I and II are true
d. Neither I nor II are true

12. Predatory bacteria
I – do not exist because bacteria are too small
II – have to be larger than their prey

a. I only is true
b. II only is true
c. Both I and II are true
d. Neither I nor II are true

a. Natural source
b. Animal reservoir
c. All of the above

18. The science of epidemiology is concerned and evolved in relation to the study of _____ diseases.

a. *Bacterial*
b. Viral
c. Fungal
d. Parasitic
e. Epidemic

19. Disease is a response to

a. Environmental factors
b. Specific infective agents
c. Inherent defects of the body
d. All of the above
e. None of the above

20. Who was the first epidemiology?

a. Francis Crick
b. Walter Gilbert
c. Fred Sanger
d. John Snow
e. James Watson

21. The classic epidemiological studies carried out in London between 1849 - 1854 were due to _____ outbreak.

a. Small pox
b. Cholera
c. Influenza
d. Typhoid fever
e. Yellow fever

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

5. Removal of solids

a. Primary treatment
b. Second treatment
c. Tertiary treatment
d. None of these

6. Activated sludge

a. Primary treatment
b. Second treatment
c. Tertiary treatment
d. None of these

7. Chemical precipitation of phosphorus

a. Primary treatment
b. Second treatment
c. Tertiary treatment
d. None of these

8. Trickling filter

a. Primary treatment
b. Second treatment
c. Tertiary treatment
d. None of these

9. I – The use of manganese in magnetosomes by magneto-aerotactic bacteria
II – the use iron in magnetosomes y magneto-aerotactic bacteria

b. ii only is true
c. both i and ii are true
d. neither i nor ii are true

25. _____ members of the genus Frankia are

i. Capable of nitrogen fixation for trees and shrubs
ii. Readily cultivated bacteria

a. i only is true
b. ii only is true
c. both i and ii are true
d. neither i nor ii are true

26. _____ throughout the world, soils are being imported by mineral nitrogen releases form

71. A cellular nonliving agent consisting of a protein coat that surrounds a nucleic acid core are called

a. Viruses
b. Prions
c. Prokaryotes
d. Viroids
e. Nucleoproteins

72. Adenovirus has genes that suppress expression of class I MHC and thus evade being targeted by

a. T cells
b. Cells
c. Enzymes
d. Lytic factors

73. An example of an infection that is not communicable would be

a. Streptococcus infections
b. Staphylococcus infections
c. Clostridium infections
d. HIV infections

74. If a child has chickenpox and contracts a staphylococcal infection associated with the pox, the staphylococcal infection would be classified as

a. Primary
b. Secondary
c. Subacute
d. Chronic

75. The outcome of an infection depends on the

a. Virulence of the pathogen
b. Response of the host

a. Resulting in release of NO and N_2O which are greenhouse gases.
b. Causing methane gas to be consumed
c. Causing methane gas to be produced
d. Causing antibiotic production in bacteria leads to antibiotic resistance
e. Assimilation of NO_3^- by the plants

52 Methanotrophic bacteria

a. Oxidize methane gas
b. Produce methane gas
c. Utilize methane as the electron source for reduction process

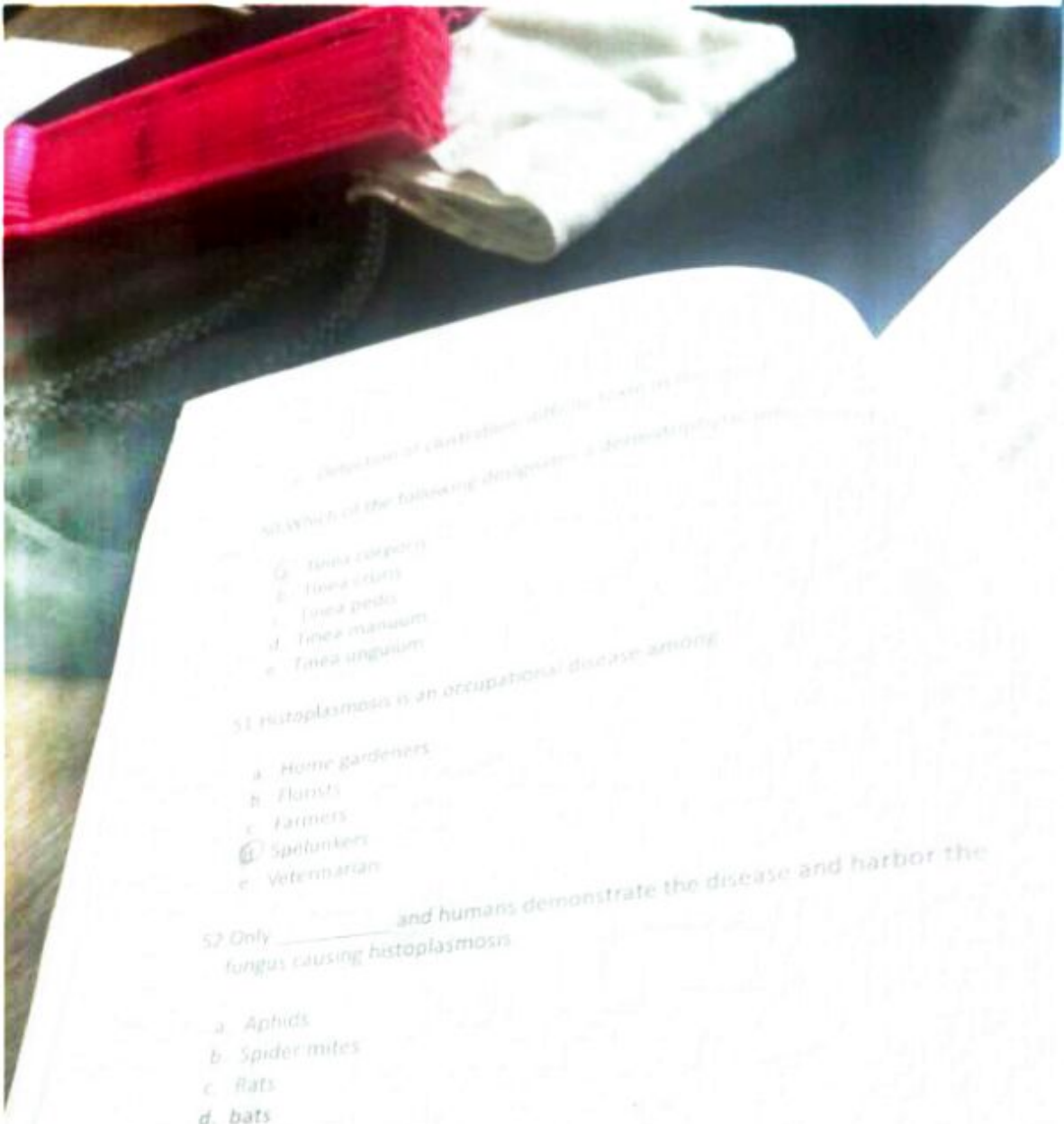
26. I – the amount of reduction potential required for nitrite assimilation
II – the amount of reduction potential required for nitrification

a. I is greater than II
b. II is greater than I
c. I is exactly or approximately equal to II
d. I may stand in more than one of the above relations to II

Microorganism interactions and microbial ecology

27. Which of the following statements is true?

a. Symbiosis refers to different organisms living together.
b. Members of a symbiotic relationship cannot live without each
c. Symbiosis refers to different organisms living



I — photosynthetic organisms
II — herbaceous organisms

a. I only is true
b. II only is true
c. Both I and II are true
d. Neither I nor II are true

For the next items, each item lists two categories numbered I and II.

to I — parasitic organisms
II — bacteria

a. All members of I are also members of II, but not all members of II are members of I.
b. All members of II are also members of I, but not all members of I are members of II
c. All members of I are members of II and all members II are members of I
d. No member of I is also member of II

but able to live and grow in environments of very high salt concentration and temperatures above boiling belong to which of these domains?

a. Prokaryotes
b. Eubacteria
c. Archaea
d. Animalia
e. Protozoa

56. All of the following are true with regard to fungi EXCEPT

a. They are eukaryotes
b. Some are single-celled and others are multicellular
c. Most are photosynthetic and derive their energy from sunlight
d. Yeasts, molds, and mushrooms are examples of fungi
e. All of the above are true regarding fungi

57. Organisms that are large, complex, single-celled, lacking a cell wall, and frequently classified by their means of locomotion are

a. Bacteria
b. Yeast
c. Viruses
d. Fungi
e. Protozoa

d. Reduce carbon to CH_4 and CO_2
e. None of the above

34. Interspecies hydrogen transfer as occurs between methanospirillum and syntrophobacter is an example of

a. Competition
b. Syntrophism
c. Oxidation
d. Fixation
e. Carboxylation

35. Of all the fungi that cause disease in compromised hosts, none are as widely distributed as which of the following species?

a. Aspergillus
b. Candida
c. Pneumocystis
d. Blastomyces
e. Coccidioses

from the erythrocyte by lysis?

a Trophozoite
b Schizont
c Merozoite
d Microgametocyte
e Macrogametocyte

43 When an infected _____ takes a human blood meal, it introduces flagellated promastigotes into the skin of the definitive host.

a Mosquito
b Deer tick
c Sand fly
d Buffalo gnat

44 Epididymo-orchitis

a Is associated with prostatitis
b Is a complication of gonococcal urethritis
c Is a manifestation of genital infection with ureaplasma spp
d Occasionally complicates mumps

c. Morbidity

16. Typhoid Mary spread disease through her

a. Teaching
b. Cleaning
c. *Cooking*
d. All of the above
e. None of the above

17. Remote sensing can be used to study the distribution of
environmental correlates of microbial diseases. It involves which of the
following?

a. Blood sampling
b. Questionnaires

d. Chronic carrier

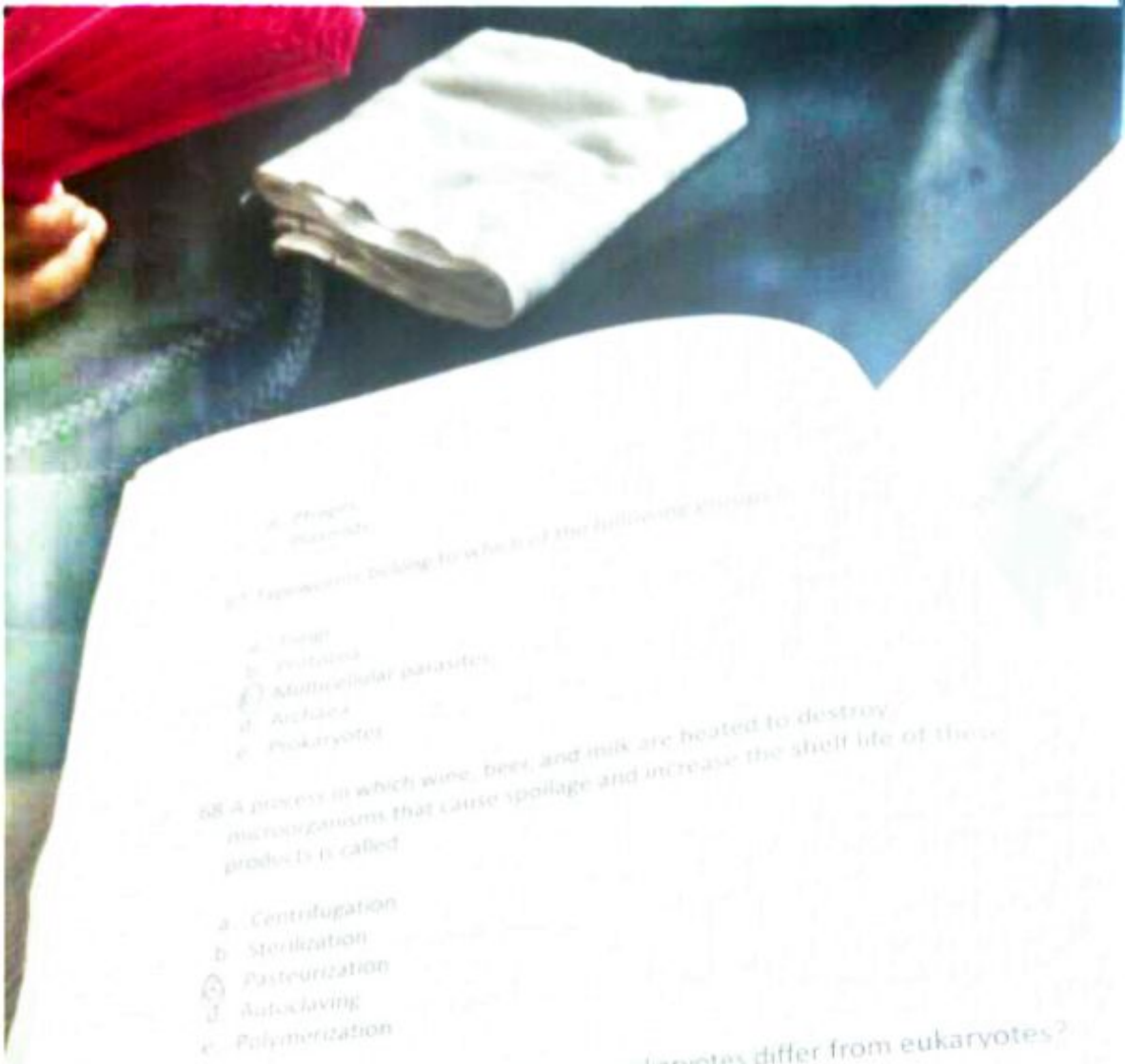
11. Which virulence enhancing mechanism of a pathogen is considered to be a mobile genetic element?

a. Bacteriophages
b. Plasmids
c. Transposons
d. All of the above
e. None of the above

12. The key factor responsible for the rise in drug resistant pathogens is

a. Antigenic drift
b. Antigenic shift
c. Inappropriate use of antimicrobial therapy
d. Bad hygiene
e. Vaccination

13. Usually, pandemic disease spread among



host, a state ________________ exist

a. Disease
b. Secondary complication
c. Infection
d. Quality health

64. Organisms that cause disease only when introduced into an unusual location or into an immunologically compromised host may best be classified as

a. Avirulent
b. Pathogens
c. Opportunist pathogens
d. latent pathogens

65. Organisms such as rickettsia or viruses may be described as

a. Obligate intracellular parasites
b. Facultative pathogens
c. Extracellular parasites
d. Avirulent

66. Protozoa ...

to

a. The neutral pH
b. The high pH
c. The low pH
d. The high turnover rate of contents
e. The inhibitory action of bile

33.I. the amount of nutrients in tropical ecosystems

II. the amount of nutrients bound up in plants and animals in tropical ecosystem

a. I is greater than II
b. II is greater than I
c. I is exactly or approximately equal to II
d. I may stand is more than one of the above relations to II

34.I. the percentage of vascular plants with mycorrhizae

II. The percentage of vascular plants without mycorrhizae

a. Subclinical
b. Acute
c. Chronic
d. Focal

59. The transmission of Hepatitis b virus by the stick of a needle is an example of which of the following modes of transmission?

(a) Direct contact
b. Vector
c. Airborne
d. Fomite

60. This part of the bacteria cell wall is responsible for the toxic properties of the endotoxin produced by some bacteria

38. Which of the following was discovered by Van Leeuwenhoek in the late 1600s when he examined his own stools?

a. Naegleria
b. Giardia
c. Pneumocystis
d. Cryptosporidium
e. Entamoeba

39. Which is responsible for causing primary amebic meningoencephalitis?

a. Naegleria
b. Giardia
c. Pneumocystis
d. Cryptosporidium
e. Entamoeba

40. The causative agent of malaria is a/an

a. Amoeba
b. Protozoa
c. Sporozoa
d. Flagellated protozoa
e. Mosquito