**Food Microbiology (NUTD 343) 1st Semester 2019/2020**

**Instructor: Dr. Mohammed Farraj Midterm Exam 9/12/2020**

**Multiple choice (1 point each)**

1. Archaea is chacterized by:

a. it contains muramic acid

b. it doesn’t contain muramic acid

c. it contain peptidoglycan layer

d. it doesn’t contain peptidoglycan layer

2. The difference between the cell wall of bacteria and aechaea is:

a. both cell walls contain N-acetyl galactose amine

b. both cell walls contain muramic acid

c. the 16s RNA is not similar

d. both are prokaryotes

3. Sterols are not found in the cell wall of all of the following except:

a. mycoplasms

b. E. coli

c. both organisms

d. none of the above

4. porin proteins are found

a. in the cell wall of gram positive and gram negative bacteria

b. only in the cell wall of gram positive bacteria

c. in the cell wall of eukayotic organisma

d. only in the cell wall of gram negative bacteria

5. Crosslinking of the peptidoglycan layers in gram positive bacteria occurs by:

a. linking of the subterminal D-ala in one chain with L-lysine in another chain

b. linking of the terminalD-ala in one chain with L-lysine in another chain

c. linking subterminal D-alanine on one chain and meso-DAP on the adjacent chain

d. linking terminal D-alanine on one chain and meso-DAP on the adjacent chain

6. The “O” antigen can be described by

a. the repeating sugar units in gram positive bacteria

b. the same as the endotoxin

c. the repeating sugar units in gram negaive bacteria

d. all of the above

7. The endotoxin activity in gram negative bacteria is located in:

a. core polysaccharide

b. lipid A

c. O-specfic side chain

d. none of the above because endotoxin is a component of gram positice cell wall

8. Newly divided cells has higher rate of metabolism and growth because

a. It is in the logarithmic phase of growth

b. its generation time is short

c. ratio of surface area: volume is higher

d. Volume/surface ratio is higher

9. Some cells may remain viable due to use of dead cell components in:

a. Stationary phase

b. Cryptic growth

c. Log phase

d. none of the above because cells need nutrients to grow

10. Water activity is a measure of

a. not free water

b. water available for biological functions

c. Total water

d. water used to dissolve solutes

11. the Aw of dried fruits and nuts is

a. 0.92-0.98

b. 0.88 – 0.90

c. 0.6 – 0.85

d. 0.1-0.2

12. cells can sense pH by one of the following

a. it carries pH sensers on its membrane

b. pH external to the cell decreases to 5.0

c. adding and removing electrons to ptoeins to change their structure

d. pH gradient due to increasing acidity inside the cell

13. The advantages of indicator organisms include all the followimh except

a. not pathogenic

b. directly detect the presence of pathogen

c. must be identified by higly sensitive and specific molecular tests

d. present in high numbers

14. Which of the following structures is never present in a prokaryotic cell?

a. cell wall

b. ribosome

c. nucleus

d. flagella

15. The rigidity and shape of the bacterial cell is due to the:

a. Cell membrane

b. Peptidoglycan layer

c. The lipopolysaccharide

d. The teichoic acid layer

16. incubation of coliforms at high temperature of ~45o C + 0.2 is used to:

a. toxin producing strains grow well at this temperature

b. fecal coliforms can grow at thi temperature

c. nonfecal coliforms can grow at this temperature

d. incubation at this temperature helps identify thermophiles

17. Peptidoglycan:
a. consists of lipids and proteins
b. regulates entry and exit of the cell via transport proteins
c. consists of repeating units of N-acetyl glucosamine and N-acetyl muramic acid

d. is found only in gram positive bacteria

18. Crosslinking occurs between terminal of the peptidoglycan layers in gram positive bacteria occurs by

a. linking of the subterminal D-ala in one chain with L-lysine in another chain

b. linking of the terminalD-ala in one chain with L-lysine in another chain

c. linking subterminal D-alanine on one chain and meso-DAP on the adjacent chain

d. linking terminal D-alanine on one chain and meso-DAP on the adjacent chain

19. The largest amounts of dipicolinic acid is found in this spore component:

a. cortex

b. germ cell wall

c. inner cell membrane

d. core

20. The two spore components that contain peptidoglycans:

a. exosporium and spore coat

b. outer membrane and inner membrane

c. cortex and germ cell wall

d. core and cortex

21. The following organism is associated with bloody diarrhea and beef

a. Enterotoxigenic E. coli

b. Shigella species

c. Enterohemorrhagic E. coli

d. all of the above

22. E. coli O157:H7 doesn’t ferment this sugar within 24 hours

a. glucose

b. lactose

c. mannitol

d. sorbitol

23. All the following are mechanisms used by Enerohemmorrhagic E. coli to resist gastric acid except:

a. decarboxylation of amino acids

b. decarboxylation of lipids

c. proton pump

d. oxidation in the presence of glucose

24. all the following Shigella species ferment mannitol except:

a. S. flexeneri

b. S. Sonnei

c. S. boydii

S. dysenteriae

25. These two types of foods that are incriminated in causing infections by shigella:

a. refrigerated food and beef

b. beef and parsley

c. refrigerated food and lettuce

d. refrigerated foods and frozen food

26. The reservoir for yersinia, E.coli O157 is:

a. vegetables and humans

b. poultry

c. frozen foods, canned foods and fish

d. beef and humans

27. The transition from a normal vegetative cell cycle to sporulation is triggered by: (2) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**28 .** What will be the aw of a solution containing 10% (weight/weight) glucose? (3 points)

29. If the initial number of cells during the logaritmic phase of growth was 1000 cells, after 2 hours, the number became 1x106, calculate the the generation time (2 points),

**Answer the following essay questions: (3 points each)**

1. What is the difference between intrinsic and extrinsic factors in food? Name one intrinsic factor and one extrinsic factor that you think are very important for controlling microbes in food. Why do you think that they are important? How do they work?

2. Discuss how spore water content influences heat resistance. How does this integrate with what else you know about thermal lethality (i.e., wet versus dry heat, heat resistance at low water activity, etc.)?

3. Fecal coliform counts are more informative under many circumstances than coliform counts. Briefly describe the difference between the two indicator methods and provide a scenario for the use of each.

4. *E. coli* O157:H7 produces Stx. Explain how Stxs affect host cells and the role they play in disease.

5. Based on characteristics of *E. coli* O157:H7, what tests could be performed to distinguish the pathogen from other *E. coli* strains?

6. Serovar Enteritidis has been difficult to control in poultry. What unique characteristic(s) of this pathogen contributes to the control problem?