

Exam of Practical Microbiology

Q1 / Multiple choices: (12 marks)

1. Which structure protects bacteria from being phagocytized?

- A. Endospore. C. Fimbriae E. All of the choices are correct
B. Cell membrane D. Capsule

2. The outcome of the Gram stain is based on differences in the cell's

- A. Ribosomes. C. Plasmid E. Flagella
B. Cell wall D. Cell membrane

3. Which order below reflects the correct procedure for Gram staining?

- A. Alcohol -Crystal violet-Safranin-Iodine. D. Crystal violet-Iodine-Alcohol -Safranin.
B. Crystal violet-Alcohol -Iodine-Safranin. E. Iodine-Safranin-Crystal violet-Alcohol.
C. Alcohol -Safranin-Crystal violet-Iodine.

4. During the Gram stain, gram _____ cells decolorize when the alcohol is applied.

- A. Positive. C. Both positive and negative E. All of the choices are correct
B. Negative D. Neither positive nor negative

5. Peptidoglycan is a unique macromolecule found in bacterial

- A. Cell walls. C. Capsules E. Inclusions
B. Cell membranes D. Slime layers

6. Lipopolysaccharide is an important cell wall component of

- A. Gram negative bacteria. C. Acid fast bacteria E. Protoplasts
B. Gram positive bacteria D. Mycoplasmas

7. Which term is not used to describe bacterial cell shapes?

- A. Coccus. C. Vibrio E. Spirochete
B. Tetrad D. Rod

8. An irregular cluster of spherical cells would be called a/an

- A. Palisades. C. Staphylococcus E. Spirilla
B. Sarcina D. Streptococcus

9. An example of those bacteria that produce pigment in their surrounding is:

- A. *Staphylococcus aureus*. C. *Proteus mirabilis* E. *Micobacterium tuberculosis*
B. *Escherichia coli* D. *Pseudomonas aeruginosa*

10. A mixed culture is:

- A. a culture that contains many species.. D. all of the choices are correct.
B. a culture tainted with intruding microorganisms. E. none of these is correct.
C. a culture of a single cell species, without presence of any contaminants, and it is derived from mixed culture.

11. *Staphylococcus aureus* is:

1. A. Bacillus, B. coccus, C. spirillum.
2. A. Diplo, B. cluster, C. octa.
3. A. Gram positive, B. Gram negative
4. Under microscope shows as A. purple, B. pink, C. red, D. violet.

12. A----- is defined as a visible mass of microorganisms all originating from a single mother cell

- A. Colony. C. bacterial cell E.
B. Culture D.

13. In----- bacteria grow uniformly producing general turbidity

- A. Liquid medium. C. Semi-solid E.
B. solid media D.

14. ----- is a microelement required for bacterial growth

- A. O₂. C. Calcium E.
B. Iron D. zinc

15. An example of Enriched Media

- A. Nutrient agar. C. Chocolate agar E.
B. MacConkey agar D.

16. The bacterium is non-lactose fermenter, e.g

- A. Salmonella. C. E coli E.
B. Pseudomonas D.

17. Heat labile media like those containing sugar, milk and gelatin can be sterilized-----

- A. Tyndallization. C. Steam E.
B. Boiling D. autoclaving

18. *Mycobacterium bovis*, *Salmonella* species, *Escherichia coli* and *Brucella* species may be present in.

- A. Milk. C. water E.
B. juice D. yoghurt
- 19. ----- is employed mainly for thermo-labile solutions as serum, enzymes, and glucose.**
A. Ionizing Radiation. C. Filtration E.
B. Non-Ionizing Radiation D. Chemical Agents
- 20. We used ----- for sterilization.**
A. Alcohols 70%. C. Alcohols 100% E.
B. Alcohols 50% D. Alcohols 60%
- 21. In gram's stain ----- ethanol used as Decolorizer.**
A. 95% C. 75% E.
B. 70% D. 90%
- 22. The use of a single stain or dye to color a bacterium is called a.**
A. Simple stain C. Negative Stains E. (A&B&C)
B. Direct Stain D. acid fast stain
- 23. Capsules are usually composed of -----**
A. Polysaccharides C. proteins E.
B. phospholipids D. saccharides
- 24. For staining bacterial capsule we used ----- stain.**
A. Nigrosine/crystal violet C. E.
B. Safranin/ acid fast D.
- 25. -----culture tainted with intruding microorganisms.**
A. A mixed culture C. Contaminated culture E.
B. Pure culture D.
- 26. CFU referred to**
A. Bacterial cells C. Building units of colony E.
B. Colony forming unit D. All of them
- 27. Use of temperature less than 100 °C for destruction of microorganisms known as.....**
A. Tyndallization C. Pasteurization E.
B. Sterilization D. Autoclaving
- 28. is necessary in order to make them readily visible for observation of intracellular structures as well as overall morphology.**
A. Sterilization C. Culturing E.
B. Sanitization D. Staining
- 29. Gram stain is used to differentiate between gram positive and gram negative organisms. Hence, it is a stain.**
A. Structural C. Differential E.
B. Simple D. None of them
- 30. The bacterial cells will be stained purple; will appear clear against the dark background**
A. Endospore C. Cell wall E.
B. Flagella D. Capsule
- 31. The capsule considered a**
A. Protective C. Virulence factor E. All of them
B. Adherence D. Prevent of phagocytosis
- 32. use for destruction of microorganisms and its spores.**
A. Freezing sterilization C. Radiation E.
B. Heat Sterilization D. Chemical materials
- 33. Remove of microorganisms can be performed by.....**
A. Pasteurization C. Cooling E.
B. Thermal sterilization D. Centrifuge

Q2/ Put (T) for true and (F) for false sentences: (12 marks)

1. If during the gram stain procedure, the bacterial cells were viewed immediately after crystal violet was applied, gram positive cells would be purple but gram negative cells would be colorless.
True or False.
2. Boiling water (100°C) can normally destroy endospores.
True or False.
3. The term diplococcus refers to an irregular cluster of spherical bacterial cells.
True or False.
4. In negative staining, we put one drop of safranin on clean slide and mix with a part of sample, then with another slide distribute the mixture on slide to make appropriate smear surface, after 1-2 minutes, wash the slide and fix it, then examine with oil immersion lens.
5. The smear of bacteria must have unsuitable thickness.
6. The bacterium without capsule is more pathogenic than capsulated bacterium.
7. The colonies of capsulated bacteria have a solid texture.
8. The media contain *Clostridium tetani* are sterilized by using high temperature reaches to 121°C.
9. We can sterilize glass by autoclave, as we sterilize the media by oven?
10. Agar and Gelatine used for solidifying the media, in addition to their using as nutrition source for bacteria.
11. *In case of preparing a bacterial smear for examining capsules, it must heat the smear on bensen burner.*
12. The action of ethanol in Gram stain technique is to increasing the coloration of the first dye that used for staining the bacterial cells.
13. chromophore; color part of stain auxiliary part of stain
14. *Escherichia coli* is gram positive grapelike clusters bacteria.
15. *All pathogenic bacteria are chemotrophs .*
16. Capsulated Bacteria like *Klebsiella pneumonia*
17. differential staining usually provides more information about the characteristics of the cell wall (Thickness).
18. Gram staine is the first step towards classification of bacteria.
19. The capsule of *Bacillus anthracis* is composed of polymers of amino acids.
20. Bacteria cannot be seen under the microscope unless they are stained.
21. The endospore formation is a reproductive process.
22. sporogenesis can be useful for classifying bacteria.
23. Newer cultures are more likely to exhibit capsule production.
24. In capsule staining, the capsule will stain purple and the background will be dark.
25. Crystal violet acts as the primary stain.
26. Gram positive bacteria have a thick cell wall, which stain dark violet.
27. Growth medium is a liquid or gel designed to support the growth of microorganisms by providing the nutrient requirement.
28. Organisms in the genus *Stella* appear to represent the first example of radial symmetry in procaryotic cells.

34. A----- is defined as a visible mass of microorganisms all originating from a single mother cell
35. Newer cultures are more likely to exhibit capsule production.

Q3/ Fill the following blanks: (12 marks)

1. Solid media is used for the isolation of bacteria as pure culture.
2. Those bacteria that are able to grow with minimal requirements are said to non-fastidious and those that require extra nutrients are said to be fastidious.
3. Disinfection is the killing of many, but not all microorganisms.
4. Heat is most effective and a rapid method of sterilization and disinfection.
5. In Autoclaving, the sterilization is done at 15 lb per sq. inch pressure, 121°C temperatures for 15 minutes for sterilization to kill spores.
6. Gram stain belong to -----
7. In Gram-positive Cells: peptidoglycan makes up as much as 90% of the thick, compact cell wall, which is the outermost cell wall structure of Gram+ cells. Gram-negative Cells, Peptidoglycan makes up only 5-20% of the cell wall.
8. Bacterial cell examined under ----- microscopic magnification power by using -----.
9. A good smear preparation should be.....
10. basic fuchsin is an example of ----- stain while, Congo red is example of -----.
11. Many bacteria, including both gram-positive and gram-negative, may be surrounded by an outer polysaccharide-containing layer termed the glycocalyx.
12. The medium in which the culture is grown as well as the temperature at which it is grown and the age of the culture will affect capsule formation.
13. Streak method used for isolation of individual bacterial species from a sample.
14. Vegetative cells are bacteria that are actively growing, metabolizing and dividing.
15. Small acid-soluble proteins (SASPs) are also only found in endospores. These proteins tightly bind and condense the DNA, and are in part responsible for resistance to UV light and DNA-damaging chemicals.
16. Endospores are dormant or metabolically inactive forms of a bacterium that allow it to survive the harsh environmental conditions.

17. Bacillus and Clostridium sp. Are two examples of endospore forming that have medical significance.
18. When the free endospores are placed in an environment that supports growth, they will revert back to a vegetative cell in a process called germination.
19. Clostridium tetani has ----- endospore, while; C. botulinum has Subterminal endospore.
20. in differential staining technique (the Schaeffer-Fulton method) malachite green is used as ----- safranin is used as-----to stain the decolorized vegetative cells.

Q4 / Define the following. (12 marks)

1. Innate immunity:

Q5/ Give the reasons. (16 marks)

1. Steam is more effective than dry heat at the same temperature?
2. Fractional sterilization is done for 3 successive days?
3. Agar is an ideal solidifying agent?
4. Basic (Ordinary media), containing salt?
5. Adding antibiotic to selective media?
6. Reducing Media is used for anaerobic bacteria.
7. The Bacteria cell structure is simpler than that of other organisms?
8. Using Gram's iodine as a mordant?
9. Capsules are considered protective structures?
10. The best ways to visualize a capsule we must use acidic stain and a basic dye?

Q6/ Answer the following question (12 marks)

1. What is the normal range of the following tests (only two)

- a) Anti-streptolysin O (ASO or ASLO) Test:
- b) C-reactive protein (CRP):
- c) Rheumatoid factor (RF)-latex test:

Q1/ give the reasons:

11. Spores are resistant to heat, UV radiation and chemicals?
12. In some bacteria endospores Formed?
13. Special techniques for endospore staining include the Schaeffer-Fulton stain and the Moeller stain were used?
14. The Bacteria cell structure is simpler than that of other organisms?
15. Agar is an ideal solidifying agent?
16. Basic (Ordinary media), containing salt?
17. Adding antibiotic to selective media?
18. A negative stain colors the background of a smear rather than the bacteria.
19. Reducing Media is used for anaerobic bacteria.
20. The best ways to visualize a capsule we must use acidic stain and a basic dye?
21. Capsules are considered protective structures?
22. Antiseptics should be used only on inanimate objects.
23. Bacteria are stained
24. Using Gram's iodine as a mordant?
25. Sterilization by Moist Heat, why?
26. Steam is more effective than dry heat at the same temperature?
27. Fractional sterilization is done for 3 successive days?

Q2/ match column A to appropriate term in column B:

Comma: *Vibrio cholera*.

Spore – *Clostridium tetani*

Lysosomes proteases.

Magnesium; needed for enzymatic reactions, such as protein synthesis.

agar: seaweed

MacConkey agar : indicator media.

Boiling: Syringes, rubber goods and surgical instruments

Sterilization Time of exposure.

Loop inoculation

Pipette oven

Acidic Dyes: Congo red

CFU number of bacteria

Endospores Vegetative cells colony

Basic Dyes Crystal Violet Safranin Giemsa stain

biofilm formation ex. *Streptococcus mutans*.

Bunsen burner: loop

Complex media: MacConkey agar Brain heart infusion broth

Endo – Pigmentation; *Sarcinia* sp.

Mycoplasma pneumoniae : Pleomorphic

Q3/ write true or false:

1. chromophore; color part of stain auxiliary part of stain
2. Escherichia coli is gram positive grapelike clusters bacteria.
3. All pathogenic bacteria are chemotrophs .
4. Capsulated Bacteria like Klebsiella pneumonia
5. differential staining usually provides more information about the characteristics of the cell wall (Thickness).
6. Gram stain is the first step towards classification of bacteria.
7. The capsule of Bacillus anthracis is composed of polymers of amino acids.
8. Bacteria cannot be seen under the microscope unless they are stained.
9. the endospore formation is a reproductive process.
10. sporogenesis can be useful for classifying bacteria.
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12. In capsule staining, the capsule will stain purple and the background will be dark.
13. Crystal violet acts as the primary stain.
14. Gram positive bacteria have a thick cell wall, which stain dark violet.
15. Growth medium is a liquid or gel designed to support the growth of microorganisms by providing the nutrient requirement.
16. Organisms in the genus Stella appear to represent the first example of radial symmetry in procaryotic cells.

Q4/ choose the best answer:

1. A----- is defined as a visible mass of microorganisms all originating from a single mother cell.

Colony culture bacterial cell

2. Halobacteria are now recognized as-----.

Archaea bacteria actinomycete

3. A trait of a bacterium that tends to display the same shape regardless of physiological or environmental conditions.

Polymorphic Monomorphic

4. In----- bacteria grow uniformly producing general turbidity.

liquid medium solid media Semi-solid

5. The endoplasmic reticulum is the site where the cell manufactures:
plasma membrane, Golgi apparatus, lysosomes all of these

6. ----- is a microelement required for bacterial growth.

O₂ Iron Calcium zinc

7. An example of Enriched Media:

Chocolate agar Nutrient agar MacConkey agar

8. The bacterium is non-lactose fermenter, e.g.

Salmonella. E coli Pseudomonas.

9. Heat labile media like those containing sugar, milk and gelatin can be sterilized-----

Tyndallization Boiling Steam autoclaving

10. Mycobacterium bovis, Salmonella species, Escherichia coli and Brucella species may be present in -----.

Milk juice water yoghurt

11. ----- is employed mainly for thermo-labile solutions as serum, enzymes, and glucose.

Ionizing Radiation Non-Ionizing Radiation Filtration Chemical Agents

12. We used ----- for sterilization.

Alcohols 70% Alcohols 100% Alcohols 50% Alcohols 60%

13. In gram's stain ----- ethanol used as Decolorizer

95% 70% 75% 90%

14. The use of a single stain or dye to color a bacterium is called a simple stain. Direct Stain Negative Stains acid fast stain

15. Capsules are usually composed of -----

Polysaccharides phospholipids proteins saccharides

16. For staining bacterial capsule we used ----- stain:

Nigrosine crystal violet safranin acid fast

17. ----- culture tainted with intruding microorganisms.

A mixed culture:

Pure culture:

Contaminated culture:

18. In Schaeffer-Fulton Method ----- used as mordant.

Heat stain steam water

Q5/ fill the blanks:

1. the actinomycetes, produce antibiotics such as streptomycin and nocardicin.
2. Solid media is used for the isolation of bacteria as pure culture.
3. Those bacteria that are able to grow with minimal requirements are said to non-fastidious and those that require extra nutrients are said to be fastidious.
4. ----- is the killing of many, but not all microorganisms.
5. Heat is most effective and a rapid method of sterilization and disinfection.
 - a. In Autoclaving, the sterilization is done at 15 lb per sq. inch pressure, 121°C temperatures for 15 minutes for sterilization to kill spores.
6. Gram stain belong to -----
7. In Gram-positive Cells: peptidoglycan makes up as much as 90% of the thick, compact cell wall, which is the outermost cell wall structure of Gram+ cells. Gram-negative Cells, Peptidoglycan makes up only 5-20% of the cell wall.

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13. Streak method used for isolation of individual bacterial species from a sample.
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15. Small acid-soluble proteins (SASPs) are also only found in endospores. These proteins tightly bind and condense the DNA, and are in part responsible for resistance to UV light and DNA-damaging chemicals.
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----- safranin is used as-----to stain the decolorized vegetative cells.

Q6/ Write Importance of Sterilization

Q7/Count Sterilization Methods

Q8/ Write Sterilization mechanisms by Dry Heat:

Q9/ Count streaking patterns:

Q1/ Select the more accurate answer from the answers provided (circle both the letter and the word or phrase):

1. The most common solidifying agent added to culture media is:

- A. Starch B. Silica gel C. Gelatin D. Agar

2. Cocci are:

- A. Round to oval bacteria B. Rod bacteria C. Cylindrical shape bacteria D.
Bacillus type bacteria E. Spiral

3. In the name of *Escherichia coli*, *coli* is the:

- A. Specific epithet family B. Genus C. Species D. Kingdom

4. Which term is not used to describe bacterial cell shapes?

- A. Coccus. B. Vibrio C. Spirochete D. Tetrad E. Rod

5. An example of those bacteria that produce pigment in their surrounding is:

- A. *Staphylococcus aureus*. B. *Proteus mirabilis* C. *Micobacterium tuberculosis*
 D. *Pseudomonas aeruginosa* E. *Escherichia coli*

6. A mixed culture is:

- A. a culture that contains many species. B. a culture tainted with intruding microorganism.
 C. a culture of a single cell species, without presence of any contaminants, and it is derived from mixed culture. D. all of the choices are correct. E. none of these is correct.

7. In..... bacteria grow uniformly producing general turbidity

- A. Liquid medium. B. solid media C. Semi-solid Media D. Synthetic Media
 E. Complex Media

8. use for destruction of microorganisms and its spores.

- A. Freezing sterilization B. Heat Sterilization C. Radiation D. Sun Rays
 E. Chemical materials

9. A quadrant streak pattern is preferred when bacterial species is isolated from:

- A. Mixed cultures with suspected high cell density. B. Pure cultures and containing lower cell densities.
 C. Mixed cultures with suspected lower cell densities. D. None of them.
 E. All of A, B and C.

10. Stuart medium is

- A. Storage Medium B. Transport Medium C. Reducing Medium D. Selective Medium

Q2/ Put (T) for true and (F) for false sentences and correct the false one:

- Boiling water (100°C) can normally destroy endospores.
- The term diplococcus refers to bead like chains of spherical bacterial cells. The term diplococcus refers to an irregular cluster of spherical bacterial cells.
- We can sterilize glass by autoclave, as we sterilize the media by oven?
- Agar and Gelatine used for solidifying the media, in addition to their using as nutrition source for bacteria.
- All pathogenic bacteria are chemotrophs.
- The media contain *Clostridium tetani* are sterilized by using high temperature reaches to 121°C.
- Semi solid media contain 2% agar.
- Klebsiella* is capsule former, and *Pseudomonas* is non-flagella former.
- Pasteurization is a way of sterilization by steaming, which is done for 3 successive days.
- Colony is a visible mass of microorganisms all originating from different cells.

Q3/ Fill the following blanks:

- Those bacteria that are able to grow with minimal requirements are said toand those that require extra nutrients are said to be
- is the killing of many, but not all microorganisms.
- is most effective and a rapid method of sterilization and disinfection.
- In Autoclaving, the sterilization is done at lb per sq. inch pressure,°C temperatures for minutes for sterilization to kill spores.
- used for isolation of individual bacterial species from a sample.

6. An irregular cluster of spherical cells would be called a/an.....
7. involve counting cells that can be cultured or are metabolically active.
8. The ability of the culture to block the light can be expressed as either percent of lightthrough the tube or the amount of light in the tube.
9. Culture media can be classified according to their consistency into, and
10. MacConkey agar acts as an Because it contains That it is turned to pink colour due to formed acid and as.....because it contains

Q4/ Write the function of the following:

1. Oven.
2. Incubator.
3. Autoclave.
4. Bensen Burner.

Q5/ match column A to appropriate term in column B:

A	B
Comma	Time of exposure
Magnesium	Surgical instruments
Agar	Inoculation culture media
MacConkey agar	Oven, autoclave
Boiling	Indicator media
Loop	Enzymatic reactions
Sterilization	Seaweed
Pipette	<i>Vibrio cholera</i>

Q6/ Why

1. Fractional sterilization is done for 3 successive days?
2. Agar is an ideal solidifying agent?
3. The Bacteria cell structure is simpler than that of other organisms?
4. Basic (Ordinary media), containing salt?

With best wishes

Pishtawan A. Hamad

