

Final Examination—Fall 2007
Pathogenic Microbiology

MFEF07--2730
Biology 2730
Final Examination
E. Hoffman

Name: _____

Score: _____ points out of 105

STUDENTS:

- 1. Please use a #2 pencil on the scantron sheet.**
 - 2. Each scantron question has a point value of .75 points.**
 - 3. Record any erasures on the list provided at the front of the room.**
 - 4. Feel free to ask for further information about any of the questions.**
 - 5. The total value of this portion of the examination is 105 points.**
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1. The type of microscope that we make use of in the laboratory is called a ____ microscope.
 - A) Complex
 - B) Complete
 - C) Compensatory
 - D) None of these

2. One of the factors that are involved in the determination of the resolving power of your microscope is that known as ____.
 - A) The optical density of the lens system
 - B) The Doppler factor
 - C) The radiation transfer factor
 - D) None of these

3. The immersion oil used in conjunction with your microscope ____ the resolving power of the instrument.
 - A) Increases
 - B) Decreases
 - C) Has no effect

4. If your microscope had a 4X ocular and a 10X objective, the total magnification capability of the instrument would be ____X
 - A) 40
 - B) 14
 - C) 2.5
 - D) None of these

5. Which of the following microscopes has the best resolving power (RP)?
- A) Microscope A, RP = 1mm
 - B) Microscope B, RP = 0.1mm
 - C) Microscope C, RP = 0.01mm
6. Anton Van Leeuwenhoek was mentioned in connection with my introduction to the study of microbes because he ____.
- A) Was the first individual to show the existence of these forms of life
 - B) Was the first person to make use of antibiotics to combat microbial infections
 - C) Was the first person to propose the so-called Germ Theory of Disease
 - D) None of these
7. Leeuwenhoek sent many of his observations to a very famous scientific society. This was the ____.
- A) American Association for the Advancement of Science.
 - B) Royal Society of Finland
 - C) The French Academy of Science
 - D) None of these
8. Where, on the meniscus, would you read the volume of fluid in the cylinder?
- A
- B
- C
9. Which of the following organisms is in fact a single celled form of life?
- A) The Pinworm
 - B) The Euglena
 - C) The Dust Mite
 - D) Spirogyra
10. The application of Koch's Postulates allows one to ____.
- A) Determine how a microbe actually causes disease symptoms
 - B) How a microbe is transmitted from a sick individual to a healthy individual
 - C) If microbe A causes disease A
 - D) None of these
11. Koch's work in microbiology started with his now famous studies on ____.
- A) Bubonic plague
 - B) Mad Cow Disease
 - C) Anthrax
 - D) None of these

19. Which of the following lipid group plays a major structural role in biological membranes such as the cell or plasma membrane?
- A) Waxes
 - B) Mycolic acids
 - C) Phospholipids
 - D) None of these
20. If an atom is oxidized, chemists would say that it ____.
- A) Has obtained oxygen atoms
 - B) Has lost neutrons
 - C) Has lost electrons
 - D) None of these
21. The pH of normal blood is 7.4 (I believe). This means that blood is ____ in nature.
- A) Acidic
 - B) Basic
 - C) Neutral
 - D) None of these
22. As you move from the 4X objective to the 100X objective, the depth of field of the optical system ____.
- A) Decreases
 - B) Increases
 - C) Remains the same
23. The following cellular arrangement is termed a ____ formation.
- A) Streptococcal
 - B) Staphylococcal oooooooooooooooooo
 - C) Mystic
 - D) None of these
24. The best results from the Gram staining procedure come from stains run on ____ cultures.
- A) Old
 - B) Young
 - C) None of the above since culture age is unimportant when conducting a Gram Stain
 - D) None of these
25. You would expect to see nuclear membrane in cells that are ____ in nature.
- A) Prokaryotic
 - B) Eukaryotic
 - C) Mesokaryotic
 - D) None of these.

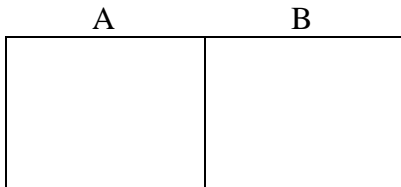
26. R. Hooke is important to the study of cells because he ____.
- A) Discovered them
 - B) Described them as they divided
 - C) Named them
 - D) None of these
27. The individual tubes that collectively make up the mycelium of a mold colony are referred to as ____.
- A) Pili
 - B) Sesi
 - C) Hyphae
 - D) None of these
28. A bacterial cell such as *E. coli* would be considered to be an example of a ____ form of life.
- A) Coenocytic
 - B) Colonial
 - C) Unicellular
 - D) None of these
29. *Candida albicans* is a type of fungus that belongs to a class known as the ____.
- A) Mildews
 - B) Yeasts
 - C) Sporozoans
 - D) None of these
30. One of the major situations that can result in the above-mentioned microbe (#29) causing infections in man is ____.
- A) The consumption of diets high in fats
 - B) The use of antibiotics
 - C) The continuation exposure to cold temperatures
 - D) None of these
31. Which of the following bacteria is most likely acid fast positive in nature?
- A) *Bacillus thuringensis*
 - B) *Escherichia coli*
 - C) *Proteus vulgaris*
 - D) None of these.
32. Which of the following bacteria is mostly likely to be capable of forming endospores?
- A) *Bacillus thuringensis*
 - B) *Escherichia coli*
 - C) *Proteus vulgaris*
 - D) None of these.

33. Bacterial cells are considered to be ____ in nature.

- A) Eukaryotic
- B) Metakaryotic
- C) Prokaryotic
- D) None of these

34. Based on the concept of diffusion, materials would be expected to move from chamber ____

- A) A to B
- B) B to A



35. Cellular transport systems which make use of energy to move materials across the plasma membrane of a cell are termed ____ transport systems.

- A) Passive
- B) Trophic
- C) Active
- D) None of these

36. One of the principle reasons to conduct a negative stain would be to ____.

- A) Determine the optical density of the microbe
- B) Determine the shape of the microbe
- C) Determine the virulence of the microbe
- D) None of these.

37. Which of the following bacterial cells is exhibiting the best developed capsule?

- A)
- B)
- C)

38. The Gram reaction of the bacterial cell is tied to the nature of its ____.

- A) Ribosomes
- B) Glycocalyx
- C) Cell wall
- D) None of these

39. If the chemical LPS (Lipopolysaccharide) was detected in connection with a bacterial infection, you would expect to find that the bacterium was ____ in nature.

- A) Gram positive
- B) Gram neutral
- C) Gram negative

47. You were introduced to a sterilizing procedure known as Tyndallization. In this process, it is necessary to store materials for a period of time. This is done to ____.
- A) Allow for the evaporation of toxic residues
 - B) Allow time for vegetative cells to die
 - C) Allow time for endospores to germinate
 - D) None of these
48. The most commonly used chemical sterilizing agent is ____.
- A) Nitric oxide
 - B) Ozone
 - C) Ethylene oxide
 - D) None of these.
49. You were introduced to the concept of mode of action of antimicrobial agents. The term refers to ____.
- A) How the agent is produced
 - B) How the agent comes into contact with the microbe
 - C) How the agent causes “problems” for the microbe
 - D) None of these.
50. Which of the following temperatures would be considered a cardinal temperature?
- A) The thermal death temperature
 - B) The maximum temperature
 - C) The sporogenic temperature
 - D) None of these
51. A bacterium whose optimal temperature is 30C would be considered a ____ bacterium.
- A) Mesophilic
 - B) Diaphilic
 - C) Psychrophilic
 - D) None of these
52. *Trichomonas vaginalis* is a STD agent that belongs to the group of microbes known as the ____.
- A) Algae
 - B) Fungi
 - C) Protozoans
 - D) None of these
53. The autoclave makes use of ____ to do its job of sterilization.
- A) Dry heat
 - B) Moist heat
 - C) Translational heat
 - D) None of these.

61. One of the major problems that viruses presented to the early investigators of these organisms was their ____.
- A) Virulence
 - B) Optical density
 - C) Protein nature
 - D) None of these.
62. Which of the following terms would be associated with the exit of viruses from their host cell?
- A) Conjugation
 - B) Budding
 - C) Flocculation
 - D) None of these
63. The Lock and Key Theory is an attempt to explain how enzymes ____.
- A) Are produced
 - B) Identify their substrates
 - C) Do their job
 - D) None of these
64. Many microbiological growth media contain the carbohydrate, agar. This material serves as a(an) ____ in these materials.
- A) Energy source
 - B) Vitamin source
 - C) Solidifying agent
 - D) None of these
65. An excellent reference book to obtain information about the chemical make up of SIMS medium would be ____.
- A) Your textbook
 - B) The Difco Manual
 - C) Bergey's Manual
 - D) None of these.
66. The HIV virus is what is known as a ____ virus.
- A) DNA
 - B) RNA
67. In the case of the HIV virus, the enzyme reverse transcriptase plays a key role in its reproduction. This enzyme ____.
- A) Is very involved in the production of ATP
 - B) Allows the virus to replicate its DNA molecule
 - C) Allow the virus to make a DNA copy of its RNA genetic information
 - D) None of these.

68. Viroids can be described as being ____.
- A) Naked protein molecules
 - B) Naked DNA molecules
 - C) Naked RNA molecules
 - D) None of these
69. At the present time there are only a very few known human illnesses that can be attributed to infection with Viroids.
- A) True
 - B) False
70. If a human cell is invaded by a virus and then undergoes transformation, this cell is now said to be ____ in nature.
- A) Autotrophic
 - B) Pleomorphic
 - C) Cancerous
 - D) None of these
71. Which of the following is an accepted sample size when conducting a standard plate count?
- A) 1ml
 - B) 10ml
 - C) 100ml
 - D) None of these
72. If one is conducting sterilization of a fluid by the filtration method, you would be advised to be most concerned with ____ contamination of the fluid.
- A) Protozoan
 - B) Fungal
 - C) Viral
 - D) None of these
73. The Tsetse fly is the recognized vector of which of the following diseases?
- A) Lyme disease
 - B) Cholera
 - C) African Sleeping Sickness
 - D) Bubonic plague
74. The following nitrogenous base sequence in DNA would code for ____ amino acids.
ACTTACTAACCGTAG
- A) 4
 - B) 5
 - C) 6
 - D) None of these

75. If a m-RNA codon is CUG, anticodon associated with this codon is ____
- A) AUG
 - B) GUT
 - C) GAC
 - D) None of these
76. In the case of temperate phage, its penetration into the cytoplasm of a bacterial cell is followed by ____.
- A) The destruction of the bacterial cell
 - B) The replication of the phage
 - C) The insertion of the genetic information of the phage into the chromosome of the bacterium
 - D) None of these
77. In the above situation (#76) the process of induction leads to ____.
- A) The destruction of the phage
 - B) The production of interferons
 - C) The production of restriction endonucleases
 - D) None of these
78. The type of antibiotic sensitivity testing that you conducted in the laboratory is considered to be ____ testing.
- A) In vivo
 - B) In vivum
 - C) In vitro
 - D) None of these
79. Plaques are really ____.
- A) Viruses which are very small
 - B) Viruses which are highly virulent
 - C) Holes in a lawn of bacteria
 - D) None of these
80. The commonest vector borne disease of man in the USA at the current time is ____.
- A) Typhus
 - B) Bubonic plague
 - C) Lyme disease
 - D) None of these
81. One of the classic chemical defense barriers that we humans have is the ____ that is found in our stomach.
- A) Hydrochloric acid
 - B) Phosphoric acid
 - C) Fatty acid
 - D) None of these

82. You would expect to find a normal flora in ____.
- A) The brain
 - B) The kidney
 - C) Your lymph nodes
 - D) None of these
83. Interferons are a group of chemical substances which seem to have their role in defending against invading ____.
- A) Protozoans
 - B) Fungi
 - C) Viruses
 - D) None of these
84. The complement system is a group of ____ which are found in the blood and play numerous roles in the defense of the body.
- A) Lipid
 - B) Carbohydrate
 - C) Proteins
 - D) None of these
85. As was mentioned in class, there are several points to attack microbial cells with the use of antimicrobials. One of those attack points involved the ____ of the bacterial cell.
- A) Mitochondria
 - B) Cell wall
 - C) Flagella
 - D) None of these.
86. A silent mutation involves changes in the DNA of the microbe that lead to ____.
- A) A defective protein but the microbe still lives
 - B) No change in the protein governed by that gene
 - C) No changes in the m-RNA controlled by that gene
 - D) None of these
87. The ELISA procedure that you conducted in the laboratory was called an indirect ELISA. This means that you were attempting to determine if the hypothetical patient had the problem by looking for ____.
- A) The agent itself
 - B) Antibodies produced against the agent
 - C) Antigens produced by the agent
 - D) None of these

88. The commonest parasitic worm infection in the USA is currently that of ____.
- A) Ascaris
 - B) The Beef Tapeworm
 - C) The pinworm
 - D) None of these
89. The “father of Phagocytosis” was ____.
- A) Pasteur
 - B) Weymond
 - C) Domagck
 - D) None of these
90. Of all of the major classes of WBCs that are found in man, it is the ____ that are normally the most numerous.
- A) Basophiles
 - B) Eosinophiles
 - C) Neutrophiles
 - D) None of these
91. One of the phenomena that leucocytes can engage in is called diapedesis. This process involves the ____.
- A) Phagocytosis of viruses by white blood cells
 - B) Exiting of white blood cells from the circulatory system
 - C) Production of white blood cells by the body
 - D) None of these
92. If you were conducting a phage typing procedure, you would examine bacterial lawns for the presence of ____.
- A) Microcolonies
 - B) Genomes
 - C) Satellite colonies
 - D) None of these
93. You were also introduced to the concept of using informational macromolecules as a means to identify bacterial species. If you were to do this, one of the types of molecules that could be used would be ____.
- A) Sugars
 - B) Starches
 - C) Proteins
 - D) None of these
94. Both the hydrogen sulfide and indole test were run using ____.
- A) Citrate agar
 - B) SIMS agar
 - C) Nutrient agar
 - D) None of these

95. A positive Catalase test results in the formation of ____.
- A) A red color
 - B) A dark color in the medium
 - C) Bubbles
 - D) None of these
96. Durham tubes are used to ____.
- A) Determine the pH of a medium
 - B) Determine if “gas” has been produced
 - C) Determine the nature of the carbon source used by the microbe
 - D) None of these
97. Which reaction best describes starch hydrolysis?
- A) Starch + oxygen \rightarrow carbon dioxide + water
 - B) Starch + water \rightarrow sugar
 - C) Sugar + water \rightarrow starch
 - D) Sugar + sugar \rightarrow starch
98. The change in the medium due to a positive Urease test is the result of ____.
- A) Changes in the amount of oxygen in the medium
 - B) Changes in the pH of the medium
 - C) Changes in the water concentration in the medium
 - D) None of these
99. Humans acquire the hookworm by ____.
- A) Having it present in the foods they eat
 - B) Having it transmitted to them by the bite of an insect
 - C) Having it enter through the skin
 - D) None of these
100. Which of the following structures is associated with tapeworm?
- A) Capsomeres
 - B) Sensory pores
 - C) Scolex
 - D) None of these
101. Antigens can be defined as chemical substances which ____.
- A) Are carbohydrate in nature
 - B) Trigger the production of antibody by the body
 - C) Can survive passage through our digestive tract
 - D) None of these

102. Antibodies belong to a group of blood substances known as the ____.
- A) Alpha globulins
 - B) Beta globulins
 - C) Gamma globulins
 - D) None of these
103. Antibodies are ____ in nature.
- A) Lipid
 - B) Carbohydrate
 - C) Protein
 - D) None of these
104. Mannitol salt agar is used in a number of medical situations when the need arises to cultivate members of the genus, ____.
- A) *Pseudomonas*
 - B) *Streptococcus*
 - C) *Staphylococcus*
 - D) None of these
105. The agent that works to select the above-mentioned genus (#104) is the ____ component of the medium.
- A) Mannitol
 - B) Salt
 - C) Citrate
 - D) None of these
106. The ability to ferment Mannitol is indicated by the development of a __ color in the medium.
- A) Pink
 - B) Green
 - C) Blue
 - D) None of these
107. The number of different antibody classes that are currently recognized is ____.
- A) 2
 - B) 3
 - C) 4
 - D) None of these
108. The type of antibody produced at the beginning of an encounter with a new antigen is that known as ____.
- A) IgA
 - B) IgB
 - C) IgC
 - D) None of these

109. The arrow in the sketch of a typical antibody is indicating what is known as a ____.
- A) Polyproteinoid chain
 - B) Heavy chain
 - C) Macrolide chain
 - D) None of these
110. The so-called “mother of vaccination” introduced a vaccination procedure to protect against the disease ____ into western Europe.
- A) Measles
 - B) Small pox
 - C) Bubonic plague
 - D) None of these
111. When you vaccinate an individual, you are really trying to cause what is known as a ____ response in that individual.
- A) Primary
 - B) Secondary
 - C) Tertiary
 - D) None of these
112. Small molecules such as penicillin which can cause an adverse response on the part of our immune system are referred to as ____.
- A) Proteinoids
 - B) Haptenes
 - C) Phages
 - D) None of these
113. The ground breaking work of Edward Jenner was carried out in the late 1700s in the country of ____.
- A) Germany
 - B) Russia
 - C) England
 - D) None of these
114. The above-mentioned work (#113) was aimed at protecting individuals against the disease, ____.
- A) Cholera
 - B) Mumps
 - C) Bubonic plague
 - D) None of these

115. In the discussion of antibody production, you were introduced to the so-called B and T cells. These are really a type of leucocyte or white blood cell known as the ____.
- A) Macrophage
 - B) Basophile
 - C) Lymphocyte
 - D) None of these
116. Cells known as APCs play a key role in the production of antibody in connection with T __ system.
- A) Dependent
 - B) Independent
117. T helper cell do several things to allow for antibody production. One of the actions noted in class involved the T helper cells ____.
- A) Causing the activation of complement molecules
 - B) Causing the diapedesis of Neutrophils to occur
 - C) Giving the activated B cells in the green light to take action to actually produce antibody.
 - D) None of these
118. Antibody molecules are actually produced by a specialized lymphocyte known as a ____ cell.
- A) Eosinophile
 - B) Plasma cell
 - C) Dendritic cell
 - D) None of these
119. Of the two types of antibody production, it is generally believed that most antibodies are produced using the so-called T ____ scheme.
- A) Dependent
 - B) Independent
 - C) Translational
 - D) None of these
120. NK or natural killer cells need to ____ to carry out their function in protecting the body.
- A) Come into physical contact with their “targets”
 - B) Be exposed to radiation
 - C) Triggered into a fermentative mode
 - D) None of these

121. It appears that there is a class of “suppressor” cells which watch over the production of antibody and its relationship to the level of antigen to insure that antibody is not made when it is not needed. These cells are currently thought to be a type of ___ cell.

- A) B cell
- B) T cell
- C) Q cell
- D) None of these

122. One of the mechanisms that NK cells use to destroy their targets is to ___.

- A) Induce Plasmolysis in them
- B) Produce an anaerobic environment in the area of the target
- C) Induce apoptosis
- D) None of these

123. If you were to be given a gamma globulin shot, you would have received what is known as ___.

- A) Active immunity
- B) Passive immunity
- C) Personal immunity
- D) None of these

124. Babies receive antibody molecules from their mothers while still in the womb. This is a type of ___ .

- A) Active immunity
- B) Passive immunity
- C) Personal immunity
- D) None of these

125. The first of the polio vaccines (The Salk vaccine) is an excellent example of ___ vaccine.

- A) Attenuated
- B) Dead
- C) Trophic
- D) None of these

126. The person who is usually given credit for developing the notion of an attenuated vaccine is ___.

- A) Koch
- B) von Behring
- C) Pasteur
- D) None of these

127. In the construction of vaccines, it is not uncommon to include an adjuvant. These materials have the function of ____.
- A) Preserving the vaccine against microbial spoilage
 - B) Increasing the resonance of the vaccine
 - C) Increasing the ability of the vaccine to stimulate the production of antibodies
 - D) None of these.
128. One important ability for bacteria to have if they intend to be able to infect the body is to be able to attach to body cells. Which of the following structures found in bacteria would help them in this attachment endeavor?
- A) Flagella
 - B) Volutin granules
 - C) Pili
 - D) None of these
129. Type III secretory systems are important structures found in Gram ____ bacteria attempting to penetrate into body cells.
- A) Positive
 - B) Negative
130. Endotoxins are produced by bacteria which are Gram ____ in nature.
- A) Positive
 - B) Negative
131. Which class of toxin is the most potent?
- A) Endotoxins
 - B) Exotoxins
132. *Streptococcus pyrogenes* has the ability to produce a capsule which allows it to ____.
- A) Stick to the lining of the stomach
 - B) Glue itself to a tooth in the human mouth
 - C) Remain undetected by the immune system
133. Fomites refer to ____.
- A) highly virulent microbes
 - B) Effective vaccines
 - C) Inanimate objects which can transmit disease causing microbes
 - D) None of these
134. Reservoirs refer to ____.
- A) Where microbes undergo mutation
 - B) Areas where microbes can be found when they are not causing disease in man
 - C) Areas which have unusually high numbers of microorganisms
 - D) None of these

135. The prophylactic use of antibiotics implies that these materials are being used to ____.

- A) Treat an ongoing infection
- B) Kill highly virulent bacteria
- C) Prevent the establishment of a bacterial infection
- D) None of these

136. A Nosocomial infection refers to one which is ____.

- A) Caused by members of your normal flora
- B) Acquired in a hospital setting
- C) Caused by a fungal organisms
- D) None of these

137. The concept of Probiotics involves the use of ____ to treat and control disease causing microbial organisms.

- A) Vaccines
- B) Antibiotics
- C) One's normal flora
- D) None of these

138. You were given the example of the 1918 flu virus to illustrate the concept of the superantigen. These materials are characterized by ____.

- A) Completely shutting down the ability to the immune system to respond to that antigen.
- B) Causing a massive response on the part of the immune system to that antigen
- C) Causing the massive production of antibody-antigen complexes
- D) None of these

139. You were introduced to John Snow during my comments on community hygiene. This individual is associated with ____.

- A) Vector control
- B) Sewage collection
- C) Water treatment
- D) None of these

140 Mark answer A. This is a free question. You have reached the end of the Final Examination. Do not forget the Laboratory Calculation portion of today's testing. This section has a point value of 20pts.