

國立交通大學 102 學年度碩士班考試入學試題

科目：微生物學(4523)

考試日期：102 年 2 月 3 日 第 2 節

系所班別：生物科技學系 組別：生科系乙組

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Part I: 單選題：請選出最適當的答案，每題一分。請使用答案卡作答

1. Which of the following is commonly used to establish a causative link between a particular microorganism and a particular disease?
A) Koch's postulates
B) Bergey's manual C) Antibody-antigen interaction D) Systems biology
2. *Mycobacterium tuberculosis* have high concentration of ___ in their cell walls and hence are acid-fast stained. A) Carbohydrates B) lipids C) proteins D) peptidoglycan
3. Microbiologists name microorganisms by using binomial system of
A) van Leeuwenhoek B) Linnaeus C) Koch D) Woese
4. A _____ microscope illuminates the fluorescently stained specimens with laser beam.
A) Fluorescence B) dark-field C) confocal D) scanning electron
5. Acridine orange is commonly used to stain
A) DNA B) cell membrane C) carbohydrates D) Cell wall
6. Which of the following is not true? A) Plasmids may carry genes for drug resistance.
B) Plasmids may carry genes that enhance survival of the bacterium
C) Transposable elements reproduce like plasmids
D) Transposable elements move about the chromosomes.
7. Which of the following is true of the bacterial components?
A) Lipopolysaccharide (LPS) is found in the outer membrane of G(-)bacteria
B) Capsules help bacteria escape phagocytosis by host cells.
C) LPS is also known as an endotoxin. D) All of the choices.
8. Electron cryotomography uses a specimen that has been
A) heated B) frozen C) sheared D) ionize
9. Bacterial flagella A) Enables to move toward an attractant or away from a repellent.
B) Enables to prevent from phagocytosis. C) Enables to move on solid surfaces via gliding.
D) Enables to respond to the autoinducer molecules.
10. Quorum sensing
A) A phenomenon in which bacteria monitor their own population density.
B) Is important in the regulation of genes needed for virulence.
C) Helps to regulate cell-to-cell communication D) all of the choices.
11. Which of the antigen characteristics is not required for vaccine production?
A) It is better found in all strains of the pathogen.
B) It is better excreted or found on the surface of the pathogen.
C) It is better a recombinant protein construct.
D) It is better essential for the survival of the pathogen in the host.

12. Which of the following is not a regulatory mechanism of *E. coli* lactose operon?
A) Attenuation B) Catabolite repression C) Induction D) Repression
13. Transposition by transposable elements may cause
A) Generation of new plasmid B) Activation of nearby genes
C) Mutation of nearby genes D) all of the choices
14. Which of the following is not true statement of two-component systems?
A) The regulatory system includes a sensor kinase and a response regulator.
B) The response regulator is phosphorylated by the sensor kinase
C) The response regulator is a phosphatase to remove the phosphoryl group
D) It plays a key role in regulating sporulation in *Bacillus*.
15. The collection of all different genes found in all the strains of a given species is called
A) Core genome B) Pan-genome C) Synteny D) Phylotypes
16. *Agrobacterium tumefaciens*
A) Is capable of introducing DNA into bacteria, fungi, and plant cells.
B) Grows symbiotically within root nodules of legumes.
C) Is capable of nitrogen fixation. D) Grows anaerobically as photoorganoheterotrophs.
17. Listeriosis which may cause severe symptoms in pregnant women is a(n) ___ infection
A) Airborne B) Foodborne C) Insect-borne D) Sexual transmitted
18. Which of the following is not true of *Archaea*?
A) *Archaea* can use H_2S as a source of electrons for photosynthesis.
B) They use binary fission, budding, or mitosis for reproduction
C) Methanogenic *Archaea* is obligate anaerobes that produce methane
D) Extreme halophile organism requires at least 1.5 M NaCl for growth
19. Bacterial protein translocation across cytoplasmic membrane could be achieved by
A) ATP binding cassette (ABC) transportation. B) Sec-dependent pathway.
C) Twin arginine transportation (TAT). D) All of the choices.
20. Which of the following is true of plasmids?
A) Required for the natural competent cells to uptake DNA.
B) Required for transduction to transfer bacterial genes.
C) Are small 2S DNA molecules, usually circular, that contain own replicon.
D) Are the major vehicles for horizontal gene transfer among bacteria.
21. Which of the following does not cause food-borne infection?
A) *Staphylococcus aureus* B) *Salmonella* Typhimurium
C) *Escherichia coli* D) none of the choices.

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22. Biofilms

- A) Are a homogenous structure composed of same bacterial species.
- B) Are able to protect microbes from UV light and antibiotics.
- C) Are non-organized microbial community consisting of several species of cells.
- D) Are surrounded by a layer of viable but not culturable cells.

23. Which of the following is not true of *Mycoplasma* ?

- A) They contain sterols in their plasma membrane.
- B) They glide on semi-solid surface using flagella.
- C) They lack peptidoglycan cell wall structure.
- D) They are resistant to penicillin.

24. Which of the following statements is not true of microbial growth?

- A) A batch culture is in a closed chamber with no additional medium added.
- B) Cells indefinitely remain in stationary phase unless fresh medium is added.
- C) Microaerophile requires low level of O₂ (2 to 10%) for growth.
- D) Hyperthermophile is the microbes with a growth optimum above 85 degree.

25. Siderophore is

- A) A small molecule that complexes with ferric ion (Fe⁺³).
- B) A small protein that complexes with ferric ion.
- C) A small protein that complexes with ferrous ion (Fe⁺²).
- D) A small molecule that complexes with ferrous ion.

26. Which of the following statements is not true of genomic study?

- A) The degraded and non-functional genes are called pseudogenes.
- B) The ORFs of similar function found in different genomes are called orthologs.
- C) Contig is the mobile element permanently integrated into microbial genome.
- D) Metagenomics is also called environmental genomics.

27. Which of the following statements is true of bacterial structures?

- A) S-layer is an irregularly structured layer of protein or glycoprotein
- B) Slime layer is a layer of organized and diffused materials
- C) Porin is proteins that form channels for the transport of small molecules
- D) All of the choices

28. Which of the following inhibit protein synthesis?

- A) penicillin B) cephalosporin C) chloramphenicol D) quinolone

29. Which of the following is not a polysaccharide-derived vaccine?

- A) Hib (*Haemophilus influenzae* b) vaccine B) Pneumococcal vaccine
- C) BCG (bacille Calmette-Guerin) vaccine D) Meningococcal vaccine

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30. Which of the following statements is not true of taxonomy study?
- A) G+C content is a parameter used in taxonomic analysis.
 - B) Taxonomic ranks from domain, class, order, phylum, family, genus to species
 - C) Phylogenetic trees show inferred evolutionary relationship.
 - D) Carl Woese suggested using rRNA sequence to establish phylogenetic tree
31. In functional genomic research,
- A) DNA microarray is used to measure the specific transcript levels in cells.
 - B) 2D gel electrophoresis separates proteins based on isoelectric pH and charge.
 - C) Most automated sequencing machines detect bands by autoradiography.
 - D) Chromatin immunoprecipitation is to identify antigen-antibody interaction
32. An organism that uses CO₂ as its sole or principal source of carbon is called
- A) phototroph B) autotroph C) heterotroph D) lithotroph
33. In bacterial cell cycle,
- A) Cytoskeleton protein is required for the cytokinesis
 - B) Septation is formed between two daughter cells
 - C) Z-ring is formed prior the septation process
 - D) All of the choices
34. Which of the following does not use gliding motility across solid substrates?
- A) *Bacillus* B) *Bacteroides* C) *Cyanobacteria* D) *Myxococcus*
35. Which of the following is not true of F plasmid?
- A) F plasmid is a fertility factor for bacterial conjugation.
 - B) F' plasmid results from an incomplete F⁺ × F⁻ mating.
 - C) Hfr strains contain the F factor integrated in their chromosomes.
 - D) The F⁺ to F⁻ DNA transfer follows a rolling-circle replication.
36. Which of the following statements is not true for the destruction of microorganisms?
- A) Pasteurization is the process of heating milk and other liquids
 - B) Tyndallization is the process of repeated heating and incubation of liquids
 - C) Autoclaving is the process to sterilize objects using steam under pressure
 - D) None of the choices
37. Which of the following is not true of *Streptococcus*?
- A) Could be grouped by Lancefield system on the basis of the cell wall antigens.
 - B) *S. agalactiae* cause dental plaque and caries, and periodontal disease.
 - C) *S. pyogenes* cause sore throat, cellulitis, and myositis.
 - D) *S. pneumoniae* cause not only pneumonia but also opportunistic infections.

38. Which of the following statements is not true?

- A) Lyme disease is caused by spirochetes. B) *Helicobacter pylori* is responsible for peptic ulcer.
C) Rickettsia is the cause of Rocky Mountain spotted fever. D) Syphilis is caused by *Chlamydia*.

39. The ratio of toxic dose to therapeutic dose is called the

- A) Minimal inhibitory concentration B) Toxicity index
C) Therapeutic index D) phenol coefficient

40. Which of the following is usually found in soil habitats?

- A) *Burkholderia* B) *Nitrosomonas* C) *Streptomyces* D) all of the choices

41. *Lactobacillus* grows optimally at _____ pH.

- A) Slightly acidic B) Slightly alkaline C) neutral D) extremely acidic

42. Which of the following statements is not true?

- A) Members of *Staphylococcus* are normally associated with mucous membranes
B) *Pseudomonas aeruginosa* can be a problem with cystic fibrosis patients
C) Toxic shock syndrome is often caused by *Staphylococcus epidermidis*
D) The cause of Legionnaire's disease may be originated from shower stalls.

43. Bacterial strains that can grow on minimal medium are called _____.

- A) autotrophs B) auxotrophs C) prototrophs D) minitrophs

44. Which contributes to the use of *Salmonella* in the Ames reversion assay?

- A) They are highly permeable B) They are defective in DNA repair
C) The conversion of the histidine auxotrophy mutations to histidine prototrophy
D) all of the choices

45. Members of the genus *Rhizobium*

- A) Infect broad-leaved plants and cause crown gall disease.
B) Are free living soil bacteria that fix nitrogen.
C) Grow symbiotically in root nodules of legumes where they fix nitrogen.
D) Are important nitrifying bacteria that convert nitrite to nitrate.

46. Mineralization refers to

- A) The breakdown of organic materials to inorganic materials.
B) The release of various minerals from ores.
C) The utilization of minerals as energy sources
D) The incorporation of inorganic material into organic materials.

47. The most common nosocomial infections are

- A) Urinary tract infections B) respiratory tract infections
C) Gastrointestinal tract infections. D) skin infections.

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48. Which of the following statements is not true?

- A) *Shewenella* could be excellent candidate as nanowire
- B) *Deinococcus* is extremely radiation resistant
- C) *Bacillus subtilis* is currently used as a biological insecticide
- D) *Streptomyces* are best known for their synthesis of a variety of antibiotics

49. Which of the following could be classified as emerging infectious agents?

- A) Community acquired methicillin resistant *Staphylococcus aureus*
- B) New Delhi metallo- β lactamase-1 producing *Klebsiella pneumoniae*
- C) Hemorrhagic uremic syndrome causing *Escherichia coli* O104
- D) all of the choices

50. Which of the following statements is not true of *Enteribacteria*?

- A) Members of the genus *Salmonella* are common causes of gastroenteritis.
- B) *Yersinia* is a major pathogen of crop plants
- C) *Escherichia coli* is a good indicator of fecal contamination of water supplies
- D) Lactose fermentation does not occur in *Shigalla* or *Proteus*

Part IIA 請選擇最適合的一個答案，每題一分。

51. Which of the following is correct?

- A) All viruses require host cells for reproduction.
- B) Some viruses can reproduce without host cells.
- C) Some viruses can perform photosynthesis.
- D) All viruses can replicate without hosts.

52. Which of the following is correct about the structures of viral particles?

- A) Capsids are made of lipids.
- B) Envelopes are made of proteins.
- C) Capsids are gene products of the host cells.
- D) Envelopes are from host cells.

53. Which of the following is correct? After infection, the viral genetic material will be replicated by

- A) Host enzymes.
- B) Viral enzymes.
- C) Host and/or viral enzymes.
- D) None of the above.

54. Which of the following viruses is most likely to degrade host DNAs before the completion of replication?

- A) Influenza virus.
- B) HBV.
- C) T4 phage.
- D) All of the above.

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55. Which of the following may produce proviral sequences in the host genome?
A) Retroviruses. B) Phages. C) Lentiviruses. D) All of the above.
56. Which of the following is correct about the genetic material of viruses?
A) It is DNA. B) It is RNA. C) It is DNA and RNA. D) It is either DNA or RNA.
57. Which of the following is the most likely source of new human viral diseases?
A) Food and vegetable. B) Other animals. C) Flowers in the garden. D) Plants in forests.
58. Which of the following is most likely able to denature prion particles?
A) UV. B) DNase. C) RNase. D) Protease.
59. Which of the following is correct?
A) Vaccines can be used to prevent all viral diseases.
B) Antibiotics can be used to treat some viral diseases.
C) Anti-viral drugs can be used to treat all viral diseases.
D) None of the above.
60. Which of the following can be the host for viruses?
A) Fungi. B) Algae. C) Bacteria. D) All of the above.
61. Which of the following is correct?
A) All fungi are heterotrophs. B) All protists are heterotrophs.
C) All protists are obligate parasites. D) Some fungi can perform photosynthesis.
62. Which of the following is correct?
A) Neither protists nor fungi have cell walls made of cellulose.
B) Some fungi have cell walls made of cellulose.
C) Some protists have cell walls made of cellulose.
D) All fungi have cell walls made of cellulose.
63. Fungal spores are the products of
A) Sexual reproduction. B) Asexual reproduction.
C) sexual and asexual reproductions. D) None of the above.
64. The general term for fungal infection on animals is
A) Mycosis. B) Meiosis. C) Fungosis. D) Karyogamy.
65. Which of the following is correct about conidia of fungi?
A) They are of sexual reproduction. B) They are of asexual reproduction.
C) They are produced by sporangia. D) They are mycorrhizae.

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66. Which of the following is known to be used for molecular taxonomy of fungi?
A) The structure of ribosomes. B) The sequences of ribosomal DNA.
C) The sequences of tRNAs. D) The sequences of histone genes.
67. Which of the following is most likely to have the shortest distance to fungi on the tree of life?
A) Insects. B) Bacteria. C) Plants. D) Viruses.
68. When we said a cell line is permissive to a virus, this indicates that this virus
A) causes the death of the cell. B) can penetrate the cell membrane.
C) can replicate in the cell. D) can bind to the viral receptor on the cell.
69. Viral diseases shared by animals and humans are called
A) community diseases. B) reservoirs.
C) zoonoses. D) opportunistic infection.
70. Which of the following is NOT known for culturing viruses?
A) Embryonated eggs. B) Cell/tissue cultures.
C) Animals. D) Blood agar plates.
71. Which of the following is correct about viral serology?
A) Same species of viruses share the same serotype.
B) One species of viruses may have several serotypes.
C) Not all viruses have serotypes.
D) There are only three serotypes: A, B, O.
72. Which of the following can be the source for genetic variation of viruses?
A) Homologous recombination. B) Mutation.
C) Re-assortment. D) All of the above.
73. Which of the following organisms' genome can NOT be destroyed by DNases?
A) Yeasts. B) Adenoviruses.
C) Flaviviruses. D) Molds.
74. Which of the following set requires reverse transcriptase activity for replication? A)
Retrovirus and Flavivirus. B) Hepadnavirus and Retrovirus.
C) Hepadnavirus and Picornavirus. D) Influenza virus and Poliovirus.
75. Fungi obtain nutrition by
A) secretion of exoenzymes. B) eating plants.
C) photosynthesis. D) digestion of animals.

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76. Which of the following is correct?
- A) Yeasts are the asexual stage of fungal life cycle.
 - B) Molds are the sexual stage of fungal life cycle.
 - C) Yeasts are multicellular fungi.
 - D) Molds are unicellular fungi.
77. Which of the following is common to HIV, black mold, and the pathogen of mad-cow diseases?
- A) All have cell wall.
 - B) All contain DNA as the genetic material.
 - C) None have nuclear membrane.
 - D) None can be killed by penicillin.
78. Opportunistic fungal infection is most likely to occur on
- A) Young Adults.
 - B) Injured persons.
 - C) Immuno-compromised individuals.
 - D) Sick women.
79. Human fatality caused by Aspergillus is most likely due to
- A) Mycotoxin.
 - B) Organ infection.
 - C) Blood stream infection.
 - D) Inhaling of spores.
80. Which of the following type of viral genome is NOT known to exist?
- A) double-stranded circular RNA.
 - B) double-stranded circular DNA.
 - C) double-stranded linear DNA.
 - D) single-stranded segmented RNA.

Part IIB 請選擇最適合的一個答案，每題兩分。

81. Which of the following is correct about genomic synthesis of RNA viruses?
- A) Template exchange may occur.
 - B) A tRNA may be used as the primer.
 - C) A fragment of DNA may be used as the template.
 - D) All of the above.
 - E) Only A and B.
82. The main purpose for single-colony isolation from clinical specimens is to
- A) obtain pure cell lines.
 - B) count the cell number easily.
 - C) observe the color of cells.
 - D) observe the morphology of colony.
 - E) None of the above.

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83. Which of the following is NOT correct about the maturation of a virus?
- A) It may involve protease activity.
 - B) It may involve exchange of covalent linkage.
 - C) It may involve conformational change of proteins.
 - D) All of the above.
 - E) Only A and C.
84. Which of the following is NOT a method used to study the location of viral assembly?
- A) Electron Microscopy.
 - B) Deep Sequencing.
 - C) In-vivo-tagging.
 - D) All of the above.
 - E) Immuno-detection.
85. Which of the following can be used to control the spreading of a virus?
- A) Quarantine.
 - B) Good hygiene.
 - C) Elimination of the vectors.
 - D) All of the above.
 - E) Only A and C.
86. Which of the following can be viral receptors on host cell surfaces?
- A) Lipid.
 - B) Protein.
 - C) Carbohydrate.
 - D) All of the above.
 - E) None of the above.
87. For yeast identification, which of the following is LESS likely to be used?
- A) Electron microscopy.
 - B) Morphology.
 - C) Germ tube assay.
 - D) Carbon assimilation profiles.
 - E) Single colony isolation.
88. Which of the following is correct?
- A) The diseases caused by systemic fungal infection are due to the blocking of vascular system.
 - B) The diseases caused by pulmonary fungal infections are due to degradation of lung tissues.
 - C) The diseases caused by eating fungus-contaminated food are due to mycotoxin toxicity.
 - D) All of the above.
 - E) None of the above.

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89. Which of the following is the most common type of fungal infection?

- A) Solid organ infection.
- B) Soft tissue infection.
- C) Systemic infection.
- D) Opportunistic infection.
- E) Cutaneous infection.

90. Which of the following does NOT involve fusion of two lipid bilayers?

- A) Influenza virus A infection.
- B) T7 bacteriophage infection.
- C) Release and receiving of neurotransmitter.
- D) HIV infection.
- E) West Nile Virus Infection.