

WRITTEN TEST FOR THE POST OF SCIENTIST C (PATHOLOGY)

Date: 04.06.2018

Time : 03.00 p.m

Duration : 1 hour

Total Marks :50

1. Virulence of a microorganism can be best described as:

- A. The ability to penetrate into the host tissue
- B. The ability to produce a pathological symptom(s)
- C. The ability to utilize the machinery of the host
- D. All of the above

2. The resolving power of an optical microscope is:

- A. 0.2 μm
- B. 0.2 \AA
- C. 0.2 nm
- D. 0.2 mm

3. The reduction of virulence of a microorganism is known as:

- A. Attenuation
- B. Exaltation
- C. Inactivation
- D. Hibernation

4. Which of the following structure is absent in Gram positive bacteria?

- A. Cell wall
- B. Teichoic acid
- C. Murein
- D. Outer membrane

5. The first antibody to contact invading microorganism is:

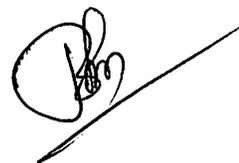
- A. IgG
- B. IgA
- C. IgM
- D. IgD

6. Inflammation is:

- A. Irreversible damage to tissue leading to cell death
- B. Reversible damage to cells leading to necrosis
- C. The production of antibodies
- D. The body's first reaction to injury

7. Histology is:

- A. The microscopic study of cells and tissues
- B. The study of diseased cells
- C. The mechanisms of disease
- D. The study of organ systems



8. What does the term auto-immune mean?

- A. A condition is congenital
- B. That the immune system has mistaken a part of the body as a pathogen and attacks it
- C. That the immune system is not functioning effectively and causing poor wound healing
- D. That the immune system cannot be depressed by drugs

9. A lesion is best defined as:

- A. Any abnormal tissue damaged by disease
- B. A eroded area of oral mucosa
- C. An ulcerated area on the palate
- D. The study of disease and disease processes

10. Granulation tissue is a feature of:

- A. Acute infection
- B. Malignancy
- B. Chronic inflammation
- D. Scar tissue

11. The hallmark of acute inflammation is:

- A. Increased blood flow
- B. Rubor, calor, dolor increased permeability of microcirculation
- C. Increased vascular permeability
- D. Vascular stress

12. Toxic granulation is most commonly observed as a Cytoplasmic inclusion of:

- A. Lymphocytes
- B. Eosinophils
- C. Monocytes
- D. Neutrophils

13. Which of the following organs is NOT a site for hematopoiesis in the fetus?

- A. Liver
- B. Bone marrow
- C. Spleen
- D. Kidney

14. An example of tumor suppressor gene:

- A. p53
- B. C-myc
- C. Ras
- D. Bcl2

15. Howell–Jolly body are composed of:

- A. DNA
- B. RNA
- C. Iron
- D. Mitochondria

16. Differential diagnosis refers to:

- A. The possible causes of a condition
- B. The likely outcome of a disease
- C. The final diagnosis
- D. The unlikely causes of the condition

17. An abscess is a.

- A. A local collection of pus
- B. The process of pus production
- C. The bodies first reaction to infection
- D. Collection of blood under the mucosa

18. A white patch that cannot be characterised clinically or pathologically as any other disease is termed:

- A. erythroplakia
- B. erythroplasia
- C. leukoplakia
- D. leukoedema

19. Amyloid deposits in kidney is stained with:

- A. Masson trichrome
- B. Congo red
- C. Methylene blue
- D. H & E Stain

20. Which of the following is benign lesion of the brain?

- A. Anaplastic astrocytoma
- B. Fibrillary astrocytoma
- C. Gemistocytic astrocytoma
- D. Pilocytic astrocytoma

21. A scientist wants to observe the localization of a particular protein within a tissue sample. Which of the following tags would be most useful for accomplishing this task?

- A. FLAG
- B. TRX
- C. GFP
- D. His

- 22. Northern, Southern, and Western blots, as originally invented by E. M. Southern, are techniques used in different areas of molecular biology. What can you learn from a Northern blot?**
- A. The length of DNA transcripts, the number of transcripts isolated, and the expression level
 - B. The level of RNase activity
 - C. The length of RNA transcripts, the number of transcripts isolated, and the expression level
 - D. The length of DNA or RNA transcripts and the number of transcripts isolated
- 23. When screening a microenvironment for its bacterial species composition, which genes are most commonly used during molecular typing?**
- A. Transfer RNA genes
 - B. Mitochondrial genes
 - C. Ribosomal RNA genes
 - D. DNA polymerase genes
- 24. A student researcher runs an agarose gel electrophoresis of a restriction enzyme digested plasmid to generate two fragments of 1200 bp and 3500 bp. The student then stains the gel with ethidium bromide. Which of the following is true about the bands that are seen on the gel?**
- A. The 1200 bp fragment will image more brightly than the 3500 bp fragment
 - B. The 1200 bp fragment will be closer to the loading wells than the 3500 bp fragment when the gel is imaged
 - C. The 1200 bp fragment will not image as brightly as the 3500 bp fragment
 - D. A simple gel electrophoresis is not sufficient to separate a 1200 bp fragment from a 3500 bp fragment
- 25. What is the purpose of adding sodium fluoride to a cell lysis buffer?**
- A. It is a tyrosine phosphatase inhibitor
 - B. It is a serine/threonine phosphatase inhibitor
 - C. It is a cysteine protease inhibitor
 - D. It is a serine protease inhibitor
- 26. What is the purpose of a phenol/chloroform extraction?**
- A. To separate DNA and RNA from proteins
 - B. To separate euchromatin from heterochromatin in cell lysates
 - C. To generate a protein lysate from tissue culture cells by lysing
 - D. To separate proteins and other impurities from DNA or RNA
- 27. Which of the following techniques most likely utilizes a detergent, such as sodium dodecyl sulfate?**
- A. Lysis of the plasma membrane
 - B. Separation of small and large ionic compounds

- C. All of these require utilization of a detergent
- D. Purification of DNA from RNA and proteins

28. What is the appropriate way to describe a solution with a pH of 3 compared to a solution with a pH of 6?

- A. It is 30 times more acidic
- B. It is 1000 times more acidic
- C. It is 3 times less acidic
- D. It is 3 times more acidic

29. What is the pH of a 0.03M hydrochloric acid solution?

- A. 0.03
- B. 4.65
- C. 5.48
- D. 1.52

30. Which of the following substances is considered a Lewis acid?

- A. BH₃
- B. NH₃
- C. Both of these compounds
- D. None of these compounds

31. A researcher adds 1M HCl acid to 1M NaOH. The concentration of hydrogen ions is _____ as the concentration of hydroxide ions.

- A. three times as much
- B. half as much
- C. the same
- D. twice as much

32. A buffer can be created by adding equal amounts of weak acid and its conjugate base. What additional information is needed to determine the pK_a of a buffer made in this manner?

- A. Concentration of acid and conjugate base
- B. pH
- C. Both of these are needed
- D. None of these are needed

33. The pH of a solution _____ when the acid dissociation constant _____.

- A. increases . . . increases
- B. does not change . . . increases
- C. increases . . . decreases
- D. does not change . . . decreases

34. A researcher performs a Bradford assay to determine the quantity of an unknown protein in his sample. The standard protein returns absorbance values of 0.101, 0.204, 0.302, 0.405 for the respective quantities of 10 μ g, 20 μ g, 30 μ g, and 40 μ g of protein. The unknown sample returns an absorbance value of 0.265. What is the quantity of protein in the unknown sample?
- A. 12.5 μ g
 - B. 52.4 μ g
 - C. 26.2 μ g
 - D. 25.0 μ g
35. A researcher wants to know the exact concentration of protein in his sample. He estimates the amount of protein to be between 30 μ g and 70 μ g. Which of the following sets of known protein amounts should he use to set up a standard curve for a Bradford assay?
- A. Range: 10 μ g–70 μ g; intervals of 10 μ g
 - B. Range: 30 μ g–70 μ g; intervals of 10 μ g
 - C. Range: 10 μ g–100 μ g; intervals of 10 μ g
 - D. Range: 50 μ g–100 μ g; intervals of 10 μ g
36. Ethidium bromide is commonly used to detect presence of DNA in DNA gels under UV light. What type of bond does ethidium bromide form with double-stranded DNA to emit fluorescence?
- A. Van der Waals bond
 - B. Ionic bond
 - C. Metallic bond
 - D. Covalent bond
37. Which type of microscopy is needed to study subcellular structures like organelles?
- A. Both scanning and transmission electron microscopy
 - B. Scanning electron microscopy
 - C. Transmission electron microscopy
 - D. Both light microscopy and scanning electron microscopy
38. What type of microscopy would you use if you want to get a topographical/3D image of your sample?
- A. Fluorescence microscopy
 - B. Transmission electron microscopy
 - C. Scanning electron microscopy
 - D. Both scanning and transmission electron microscopy
39. Which of the following is true concerning light microscopy?
- A. It can produce three dimensional images of living material
 - B. It works via a magnetic force that depends on electron concentration
 - C. It provides greater resolution than an electron microscope
 - D. It uses a light source and a glass lens to magnify images

- 40. Which of the following techniques can be used for mutagenesis?**
- A. UV light exposure
 - B. PCR
 - C. Homologous recombination
 - D. All of these answers
- 41. In a knockout, what is a chimeric mouse?**
- A. A mouse derived only from the modified stem cells
 - B. A mouse derived from two different types of stem cells
 - C. A mouse homozygous for the knockout
 - D. A mouse heterozygous for the knockout
- 42. Neurons transmit signals via transmission of an electrical signal called an action potential. Which integral membrane protein is crucial for the rising phase of an action potential?**
- A. Ligand gated calcium channels
 - B. Ligand gated sodium channels
 - C. Voltage-gated potassium channels
 - D. Voltage-gated sodium channels
- 43. In synaptic transmission, the _____ of the pre-synaptic cell can make either a chemical or electrical synapse with a _____ of the post-synaptic cell.**
- A. dendrite . . . axon
 - B. axon . . . nucleus
 - C. axon . . . dendrite
 - D. spine . . . dendrite
- 44. Toll-like receptors (TLRs) are transmembrane receptors that have an extracellular leucine-rich region and an intracellular toll-interleukin region domain. What is the primary function of TLRs?**
- A. Promote sex-specific organ growth by binding estrogen or testosterone
 - B. Elicit innate immune responses by recognizing microbial associated molecular patterns
 - C. Bind epidermal growth factor to promote cell proliferation
 - D. Promote differentiation by recognizing notch ligands
- 45. Which of the following is not true concerning G protein-coupled receptors (GPCRs)?**
- A. They are found on the outside of cell membranes
 - B. They use GTP as energy when activated
 - C. They can recognize peptide hormones as their ligand
 - D. All GPCRs will increase cAMP levels in the cell
- 46. The sodium-potassium pump works by bringing sodium _____ cells and potassium _____ cells through the use of ATP.**
- A. into and into
 - B. out of and into

- C. out of and out of
- D. into and out of

47. Which of the following is not a method used to transport substances into a cell?

- A. Exocytosis
- B. Phagocytosis
- C. Receptor-mediated endocytosis
- D. Pinocytosis

48. Which of the following can freely diffuse through the cell membrane?

- I. Oxygen
- II. Potassium ions
- III. Glucose
- IV. Hydrogen ions

Possible Answers:

- A. I only
- B. I and III
- C. I, II and IV
- D. I, II, III and IV

49. Which of the following transport mechanisms requires ATP hydrolysis to move a molecule against its concentration gradient?

- A. Facilitated diffusion
- B. Secondary active transport
- C. Active transport
- D. Passive diffusion

50. Many retroviruses, including HIV (human immunodeficiency virus) and other lentiviruses, generally binds to what structure on the plasma membrane of vertebrate cells?

- A. Cholesterol
- B. Lipopolysaccharides
- C. Glycoproteins
- D. Phosphatidylcholine

Answer Keys:

- | | |
|-------|-------|
| 1. B | 26. D |
| 2. A | 27. A |
| 3. A | 28. B |
| 4. D | 29. D |
| 5. C | 30. A |
| 6. D | 31. C |
| 7. A | 32. B |
| 8. B | 33. C |
| 9. A | 34. C |
| 10. B | 35. C |
| 11. C | 36. A |
| 12. D | 37. A |
| 13. D | 38. C |
| 14. A | 39. D |
| 15. A | 40. D |
| 16. A | 41. B |
| 17. A | 42. D |
| 18. C | 43. C |
| 19. B | 44. B |
| 20. D | 45. D |
| 21. C | 46. B |
| 22. C | 47. A |
| 23. C | 48. A |
| 24. C | 49. C |
| 25. B | 50. C |