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ROLL NUMBER

WRITTEN TEST FOR THE POST OF TECH.ASST. (LAB) – A To B
PATHOLOGY

DATE: 19/03/2024 **TIME: 9.30 to 10.30 AM**

DURATION: 60 MINUTES **Total Marks: 50**

INSTRUCTIONS TO THE CANDIDATES

1. Write your Roll Number on the top of the Question Booklet and in the answer sheet.
2. Each question carries 1 mark.
3. There will not be any Negative Marking.
4. **Write legibly the alphabet of the most appropriate answer (A, B, C or D) in the separate answer sheet provided.**
5. Over-writing is not permitted.
6. Candidate should sign in the question paper and answer sheet.
7. No clarifications will be given.
8. Candidate should hand over the answer sheet to the invigilator before leaving the examination hall.

Signature of the Candidate

19/3/24

MFCP Technical Assistant (Lab)
Pathology (including Division of Cellular and Molecular Cardiology)

1. When preparing a phosphate buffer for a biochemical experiment, which of the following is the **MOST** important factor to consider?
   a. The pKa of the chosen phosphate salt
   b. The desired final volume of the buffer solution
   c. The cost of the buffer components
   d. The color of the indicator used to monitor pH

2. Aseptic conditions are maintained during animal cell culture, except when?
   a. Working in a biosafety cabinet
   b. Using sterile gloves and lab coat
   c. Wiping down surfaces with disinfectant
   d. Using tap water to prepare culture media

3. A 1 molar solution of NaCl contains 1 mole of NaCl in:
   a. 1 L of solution
   b. 1 kg of water
   c. 1 kg of solution
   d. 1 ml of water

4. The **MOST** commonly used fixative in histopathology is:
   a. 10% neutral buffered formalin
   b. 2.5% glutaraldehyde
   c. Absolute ethanol
   d. Zenker's fixative

5. The **MOST** suitable fixative for electron microscopy is:
   a. Bouin's fixative
   b. Methanol
   c. Glutaraldehyde
   d. B5 fixative

6. All of the factors influence fixation, **EXCEPT**:
   a. pH
   b. Shape of the tissue
   c. Size of tissue
   d. Duration of fixation

7. The primary purpose of a biosafety cabinet in cell culture is to:
   a. Provide a warm and humid environment
   b. Protect the researcher from harmful cells
   c. Protect the cells from microbial contamination
   d. Protect the cells from direct light

8. The normality (N) of a solution is equal to the:
   a. Concentration of solute in moles per litre (M)
   b. Concentration of solute in moles per kilogram of solvent
   c. Number of gram equivalents of solute per litre of solution
   d. Number of moles of solute per litre of solution

9. Which of the following is the **MOST** important factor to consider when choosing a culture medium for animal cells?
   a. The cost of the medium
   b. The color of the medium
   c. The presence of antibiotics in the medium
   d. The specific requirements of the cell type being cultured

10. What is the quality of water used for medium preparation for cell culture
   a. Tap water
   b. Sterile water
   c. Autoclaved tap water
   d. Distilled water

11. The antibody that directly binds to the target protein in Western blotting is called the:
    a. Primary antibody
    b. Secondary antibody
    c. Conjugate
    d. Probe

12. The **MOST** commonly used substance for infiltration during tissue processing is:
    a. Gelatin
    b. Agar
    c. Paraffin wax
    d. Celloidin

13. The **MOST** commonly used type of microtome in histopathology laboratory is:
    a. Rotary microtome
    b. Ultra microtome
    c. Sliding microtome
    d. Sledge microtome

14. Regarding eosin stain, all of the following are true, **EXCEPT**:
    a. It is a xanthene dye
    b. Stains cytoplasm and connective tissue
    c. Binds to salts with eosinophilic compounds containing negative charges
    d. It is fluorescent

15. What is the main purpose of a Western blot?
    a. To amplify DNA
    b. To sequence RNA
    c. To identify specific proteins in a complex mixture
    d. To visualize live cells

16. Which of the following steps does **NOT** occur during Western blotting?
    a. Protein separation using gel electrophoresis
    b. Transfer of proteins to a membrane
    c. Detection of target protein using labeled antibodies
    d. Amplification of the target protein

17. The active component of haematoxylin is:
    a. Hemosiderin
    b. Hemoglobin
    c. Methemoglobin
    d. Hematein

18. Real-time PCR differs from traditional PCR in having the ability to:
    a. Amplify longer DNA fragments
    b. Detect and quantify the target cDNA in real-time
    c. Use less expensive reagents
    d. Require no specialized equipment

19. Which of the following statements about cell dissociation for cell culture is **CORRECT**?
    a. It involves separating individual cells from tissues by chopping using knife.
    b. Trypsin is a commonly used enzyme for cell dissociation.
    c. Mechanical methods like grinding the cells and centrifugation for collection.
    d. Dissociation can be performed under non-sterile conditions.

20. What is the most common method used to visualize the target protein in a Western blot?
    a. Gel staining
    b. Mass spectrometry
    c. Chemiluminescence
    d. Polymerase chain reaction (PCR)

21. The source of haematoxylin is:
    a. Tree
    b. Bacteria
    c. Sea weed
    d. Mushroom

22. Which of the following statements about Western blotting is **INCORRECT**?
    a. It can be used to determine the size of a protein.
    b. It can be used to determine the relative abundance of a protein.
    c. It can be used to identify post-translational modifications of a protein.
    d. It can be used to detect structure of a protein.

23. Ripening of haematoxylin refers to:
    a. Natural reduction
    b. Natural oxidation
    c. Chemical oxidation
    d. Chemical reduction

24. Identify the **CORRECT** statement regarding staining by haematoxylin:
    a. Hematein alone is sufficient to stain the nuclei
    b. Mordant alone is sufficient to stain the nuclei
    c. Hematein and mordant combination is sufficient to stain the nuclei
    d. Hematein and mordant combination renders the nuclei colorless

25. All of the following are steps in tissue processing, **EXCEPT:**
    a. Hydration
    b. Fixation
    c. Embedding
    d. Clearing

26. Which of the following components is **NOT** essential for a real-time PCR reaction?
    a. Taq polymerase
    b. Specific primers
    c. dNTPs (deoxynucleotide triphosphates)
    d. DNA ligase

27. Which microscope is used to visualize live cells in culture
    a. Inverted phase contrast microscope
    b. Upright fluorescent microscope
    c. Brightfield microscope
    d. Scanning electron microscope

28. In histopathology, automation is **MOST** common in:
    a. Microtomy
    b. Tissue processing
    c. Embedding
    d. Grossing

29. The colour of skeletal muscle fibres in Masson's trichrome stained section is:
    a. Blue
    b. Green
    c. Red
    d. Black

30. Which of the following statements about buffer solutions is **CORRECT**?
    a. They do not resist changes in pH upon addition of small amounts of acid or base.
    b. The pH of the buffer is insignificant
    c. They cannot be prepared using salt.
    d. They are essential for maintaining optimal enzyme activity in many biochemical processes.

31. A higher Ct (cycle threshold) value in real-time PCR indicates:
    a. Higher initial starting copy number of the target DNA
    b. Lower initial starting copy number of the target DNA
    c. Faster amplification of the target DNA
    d. Slower amplification of the target DNA

32. Which of the following is a key reason why PVDF membranes are commonly used for protein transfer in Western blotting?
    a. They are inexpensive and easy to obtain.
    b. They exhibit high protein binding capacity.
    c. They are compatible with a wide range of detergents.
    d. They naturally fluoresce, aiding in protein detection.

33. Which of the following dyes is commonly used as a chromogen in immunohistochemistry, producing a brown color to visualize the target protein?
a. Hematoxylin
b. DAB (3,3'-diaminobenzidine)
c. Eosin
d. Nile Blue

34. The colour of glycogen in PAS stain is:
a. Magenta
b. Red
c. Purple
d. Pink

35. The colour of acid fast bacilli in Ziehl-Neelsen stain is:
a. Blue
b. Green
c. Red
d. Purple

36. In a double-staining IHC experiment, two different chromogenic dyes are used. This is primarily done to:
a. Enhance the intensity of the signal for the target protein.
b. Simultaneously visualize two different target proteins in the same tissue section.
c. Differentiate between different cell types based on their morphology.
d. Reduce background staining and improve the specificity of the staining.

37. What is the optimal temperature and time combination for effective steam sterilization in a typical autoclave for cell culture applications?
a. 100°C for 1 hour
b. 121°C for 15 minutes
c. 134°C for 30 minutes
d. 150°C for 45 minutes

38. In skeletal muscle biopsies, enzyme histochemistry is performed on:
a. Paraffin embedded sections
b. Frozen sections
c. Resin embedded sections
d. Celloidin embedded sections

39. The stain used to demonstrate fungi is:
a. Grocott methenamine silver stain
b. Masson-Fontana stain
c. Warthin-Starry stain
d. Prussian blue stain

40. Monoclonal antibodies for immunohistochemistry are produced using:
a. Polyoma technique
b. Sarcoma technique
c. Hybridoma technique
d. Lymphoma technique

41. Identify the **CORRECT** statement regarding horseradish peroxidase used in immunohistochemistry:
a. Unstable enzyme
b. Small size molecule
c. Difficult to quench endogenous activity
d. High chance of contamination

42. What is the primary function of CO2 in a cell culture incubator?
a. To maintain a sterile environment
b. To provide a source of carbon for cellular metabolism
c. To regulate the temperature within the incubator
d. To increase the humidity level

43. The observed colour in a tissue section stained with fluorescein isothiocyanate (FITC) is:
a. Red
b. Blue
c. Yellow
d. Green

44. The correct sequence of steps involved in immunohistochemistry on formalin-fixed paraffin-embedded tissue is:

a. Deparaffinization - epitope retrieval - endogenous peroxidase blocking - primary antibody
b. Deparaffinization - endogenous peroxidase blocking - epitope retrieval - primary antibody
c. Endogenous peroxidase blocking - deparaffinization - epitope retrieval - primary antibody
d. Epitope retrieval - deparaffinization - endogenous peroxidase blocking - primary antibody

45. In immunohistochemistry on formalin-fixed paraffin-embedded sections, pressure cooking is used to:

a. To prevent detachment of sections
b. To block peroxidase activity
c. To break inter-molecular cross-linkages
d. To reduce background staining

46. All of the following methods can be used for signal amplification during immunohistochemistry, except:

a. Decreasing the concentration of primary antibody
b. Using a linker
c. Increasing the incubation time of primary antibody
d. Chemical enhancement of peroxidase-DAB reaction product

47. Protein markers used in Western blotting typically consist of:

a. Radioactively labeled proteins
b. Fluorescently tagged antibodies
c. Purified proteins of known sizes
d. Enzymes that cleave specific proteins

48. Which of the following methods is used for sterilization of cell culture medium that has antibiotics and serum?

a. Steam sterilization
b. EtO sterilization
c. Gamma sterililization
d. Filter sterilization

49. To prepare 0.01% solution from 1% stock solution:

a. Add 0.1ml of 1% stock solution to 99ml of water
b. Add 1ml of 1% stock solution to 99ml of water
c. Add 0.01ml of 1% stock solution to 99ml of water
d. Add 1ml of 1% stock solution to 100ml of water

50. For preparation of 1N solution of calcium chloride, the equivalent weight is:

a. ½ the molecular weight
b. Equal to molecular weight
c. Twice the molecular weight
d. ¼ the molecular weight

Pathology (including DCMC) Technical Asst (Lab)MFCP-1

ANSWER KEY

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

Law
19/3/24