TECHNICAL UNIVERSITY OF MOMBASA

Faculty of Applied and Health Sciences

DEPARTMENT OF MEDICAL SCIENCES

DIPLOMA IN MEDICAL LABORATORY SCIENCES
(DMLS)

AML 2150 : INSTRUMENTATION

SPECIAL/SUPPLEMENTARY: EXAMINATIONS

SERIES: OCTOBER 2013

TIME: 2 HOURS

INSTRUCTIONS:

You should have the following for this examination

- *Answer booklet*

This paper consists of **TWO** sections.
Answer all questions in **Section A** and **B.** ½ marks deducted for any wrong answer in **Section A**.

*This paper consists of **9** **PRINTED** pages*

SECTION A (40MARKS)

1. Which of the following affect the degree of scatter in a nephlometer:-
   a) Shape
   b) Volume
   c) Density
   d) Solvent
   e) Solute

2. The following are types of filters, except.:-
   a) Neutral filters
   b) Coloured filters
   c) Amplification filters
   d) Heat absorbing filters
   e) Exciter filters

3. Microscope filters are used for the following purpose, except
   a) Increases resolution
   b) To increase glare
   c) Increase contrast
   d) To absorb excess heat
   e) Decrease the intensity of light

4. Which of the following is an example of a microtome
   a) Rocking microtome
   b) Rotarct microtome
   c) Fridge microtome
   d) Rotary microtome
   e) Slender microtome

5. The following are the main areas in which the equipments are used in medical laboratory, except
   a) Chemistry
   b) Hematology
   c) Microbiology
   d) Blood bank
   e) Theatre

6. Microorganisms have been classified into four categories based on factors such as pathogenicity, except.
   a) Risk level 1 group
   b) Risk level 2 group
   c) Risk level 3 group
   d) Risk level 4 group
   e) Risk level 5 group

7. The biological safety cabinet is used for the following , except
   a) To protect the worker from injections material

b) To protect the being analysed from contamination
c) To protect the environment
d) To protect the lab from contamination
e) To protect the hospital from contamination

8. The maintenance of mechanical balance is limited to following routines, except
   a) Verify the level
   b) Verify the zero retting
   c) Verify the sensitivity adjustment
   d) Clean the weighing plate
   e) Check the intensity of the UV lamp

9. Which of the following is an example of a microscope
   a) Brown field microscope
   b) Interference microscope
   c) Green field microscope
   d) Re-polarized light optical microscope
   e) Diverted optical microscope

10. The following are factors that affect the choice of an analytical balance , except.
   a) Accuracy designed
   b) The quantity to be measured
   c) Centripetal force
   d) The skill s and expertise to the personnel
   e) The analytical procedure to be carried after the measurement

11. An objective lens of a microscope has a focal length of 0.2cm determine the objective distance , if image distance is 6cm.
   a) 0.206
   b) 0.9
   c) 4
   d) 5
   e) 0.68

12. The following does not fall under laboratory equipment and maintenance, except
   a) Work areas
   b) Light of all equipments
   c) Storage
   d) Archiving
   e) Equipment and maintenance policy

13. The following is true about equipment qualification
   a) Never been used before
   b) Design
   c) Installation
   d) Colour
   e) Date of manufacture

14. Biosafety cabinets must be cleaned and decontaminated

a) After spoilage
b) Every time after use
c) Before use
d) Before an engineer visits
e) It is not important to clean BSc's because the airflows clean the contaminations.

15. The following are examples of types of microscopes, except
a) Dark field microscope
b) Phase contrast optical microscope
c) Polarized light optical microscope
d) Diverted optical microscope
e) Clear field optical microscope

16. The following are advantages of automation in the lab, except
a) Increase sample through put
b) Increase specificity
c) Increase efficiency
d) Saves time and resources
e) Reduced turnaround time

17. The following are quality assurance and control in medical laboratory practice, which are is not.
a) Use of different methods and techniques
b) Use of different staff
c) Proper calibration of instruments
d) Use of different lab coat
e) Appropriate use of instruments

18. Agarose gels have been used extensively for electrophoresis to measure the following, except
a) Enzyme comphxes
b) Lipoproteins
c) Nucleiric acids
d) Parasites
e) Viruses

19. The following are disadvantages of cellulose acetate electrophorasis materials, except.
a) It requires preliminary fixing to avoid washing of compounds from the membrane
b) It is not very strong
c) It is weak when wet
d) It is brittle
e) It suffers a lot of heating effects

20. Which of the following is an advantage of paper chromatography
a) High sensitivity
b) Producer relatively good resolution
c) High specificity
d) High speed
e) Does not suffer decomposition

21. Which of the following technique is used in electrophorasis

a) Polycrylanide gel (Zone) electrophoresis
b) Gas electrophoresis
c) High performance liquid electrophoresis
d) Liquid electrophoresis
e) Thin layer electrophoresis

22. The following factors affect electrophoresis, except.
a) Quantity of the drainage and the molecule or particle
b) The electric field applied
c) The temperature of the room
d) Shape of the molecule
e) Viscosity of the fluid

23. The following are advantages of thin layer chromatography except
a) It is faster
b) Provides better resolution
c) More sensitive
d) It can separate hydrophilic, lipoid and inorganic separation unlike other techniques
e) It requires more expertise

24. The following are areas of application by high performance liquid chromatography, except.
a) Drug assays
b) Protein assays
c) Vitamin assays
d) DNA assays
e) Steroid assays

25. Which of the following is advantages of high performance liquid chromatography
a) Low resolution
b) Does not suffer decomposition
c) Low sensitivity
d) Slow speed
e) Low specificity

26. Which performance liquid chromatography is ideal in separation in the following compounds, expect
a) Aqueous soluble
b) Non volatile
c) Thermally unstable
d) Thermally stable
e) Organic materials

27. Which of the following is a disadvantage of gas chromatography
a) Speed and efficiency of all separations are temperature dependent
b) Low resolution
c) Low sensitivity
d) Cannot separate fractions at the end of the assay
e) Difficult in sample application

28. Gas chromatography method can be used for several application methods, except
    a) Steroid assays
    b) Drug level assays
    c) Organic acid separation
    d) Lipid assays
    e) Inorganic acid separation

29. Which of the following in an advantage of gas chromatography
    a) Has high resolution
    b) Low sensitivity
    c) Difficult in sample application after initial sample preparation
    d) The tractions cannot be collected at the end of the assay
    e) Vary reactive

30. The following are types of chromatography techniques except
    a) Paper chromatography
    b) Gelatin chromatography
    c) Gas chromatography
    d) Liquid chromatography
    e) Thin layer chromatography

31. The following are basic terms used in chromatography , except
    a) Elusion
    b) Eluate
    c) Extraction
    d) Loading
    e) Solvent front

32. Which factor is involved in chromatography
    a) Separation
    b) Preparative
    c) Extraction
    d) Mobile phase
    e) Analytical

33. The following are applications of electron microscope , except
    a) It can be used for physical analysis
    b) Used in virology to understand properties of viruses
    c) Used in cytology and histology to examine the imitate substructures of organelles
    d) Has led to observation of sub cellular structures
    e) It has enable the observation of RNA and DNA

34. Which one of the following is an example of analytical techniques
    a) Distillation techniques
    b) Preparative technique
    c) Dividing techniques
    d) Extraction
    e) Observation techniques

35. The electron microscope is used for physical analysis of the specimen, which one is not
    a) Volume of particles
    b) Size of particles
    c) Shape of particles
    d) Impurities
    e) Examination of surfaces details of the material

36. The following are types of electron microscopes , except
    a) Transmission electron microscope
    b) Scanning electron microscope
    c) High voltage electron microscope
    d) Low voltage electron microscope
    e) Reflection electron microscope

37. The following are parts of an interference microscope, except
    a) Light sources
    b) Beam frillier
    c) Reference beam
    d) Objectives
    e) Wave beam

38. Which of the following structures of fluorescence microscope that is used to ant higher energy radiation for protection of the eyes
    a) Barrier filter
    b) Condenser
    c) Absorbing filter
    d) Objective
    e) Exciter filter

39. The following are types of filters , except
    a) Neutral filters
    b) Coloured filter
    c) Amplification filters
    d) Heart absorbing filters
    e) Exciter fillers

40. The following are chambers that are used in conducting laboratory experiments, except.
    a) Dark room
    b) Hot chambers
    c) Light chambers
    d) Metabolism chambers
    e) Germ free chambers

SECTION B

1) (i) Discuss electrophoresis and the factors that affect it **(10marks)**

(ii) Calculate the mobility rate of a protein molecule passing through a polyacrylamid gel pore size 0.044. If the viscosity of the fluid medium is 2.4×10^{-3}N s/m when the charge on the molecule is equivalent to 100 electronic charge and an electric field of 240N/coulombs is applied **(10marks)**

2) (i) Discuss the types of electronic microscope **(10marks)**

(ii) Discuss the role of automation and advantages on medical laboratories. **(10marks)**

3) (i) Discuss absorptiometry in detail **(10marks)**

(ii) Discus the type of filters that are used in microscopes **(10marks)**