



TECHNICAL UNIVERSITY OF MOMBASA

Faculty of Applied and Health Sciences

DEPARTMENT OF **MEDICAL SCIENCES**

DIPLOMA IN MEDICAL LABORATORY SCIENCES
(DMLS 11M)

AML 2251 : CLINICAL CHEMISTRY

SPECIAL/SUPPLEMENTARY: EXAMINATIONS

SERIES: February 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**. $\frac{1}{2}$ marks deducted for any wrong answer in **Section A**.

This paper consists of 7 PRINTED pages
SECTION A (40MARKS)

1. Which of the following may be used to measure specific gravity of urine
 - a) Urinometer
 - b) Specific gravity bottle
 - c) McCartney bottle
 - d) Winchester bottle
 - e) Universal bottle

2. During electrophoresis proteins
 - a) Migrate to the positive electrode
 - b) Migrate to the negative electrode
 - c) Do not migrate
 - d) None of the above

3. Van den Berg reaction is the principle used in estimation of :
 - a) Creatinine
 - b) Bilirubin
 - c) Substrate
 - d) Uric acid

4. Biliverdin is converted to bilirubin by
 - a) Hydrolysis
 - b) Bacterial action
 - c) Oxidation
 - d) Reduction

5. Total absence in excreted urine volume is called
 - a) Anuria
 - b) Renal dysfunction
 - c) Oliguria
 - d) Polyuria

6. Water constitutes the following percentage in normal urine
 - a) 80%
 - b) 95%
 - c) 75%
 - d) 90%

7. Casts are formed
 - a) If urine is left to stand
 - b) In the bladder
 - c) In the renal tubules

- d) In renal dysfunction
8. The appearance of urine may be altered in the following conditions
- Anuria
 - Retinopathy
 - Jaundice
 - Diarrhoea
9. Urine preservatives include
- Concentrated hydrochloric acid
 - Boric acid crystals
 - Chloroform
 - Thymol
10. Gmelin's nitric acid ring test for bilirubin is based on
- Solubility
 - Lowering of surface tension
 - Oxidation of bilirubin to biliverdin
 - Reduction of biliverdin to bilirubin
11. Presence of polyuria
- Can increase SG
 - Can reduce SG
 - Can cause diarrhea
 - Can be detected by hay's test
12. Bilirubin couples with diazotized sulphanilic acid
- To result to a purple color
 - To result to azobilirubin
 - To result to biliverdin
 - To result to a green color
13. The main bile pigment(s) is/are
- Porphobilinogen
 - Stercobilinogen
 - Urobilin
 - Biliverdin
14. Which of the following is true of serum sodium and potassium?
- Potassium is an extracellular electrolyte
 - Sodium is an extracellular electrolyte
 - It is impossible to get very low potassium level
 - Potassium is an intracellular electrolyte
15. Biliverdin is converted to bilirubin by
- Hydrolysis
 - Hydroxylation
 - Oxidation

- d) Reduction
16. What is the hormone which controls water reabsorption from distal convoluted tubule?
- Aldosterone
 - ADH
 - Insulin
 - ANF
17. What is the major cation in the ECF?
- Chloride
 - Sodium
 - Bicarbonate
 - Potassium
18. A blood pH of 7.21 would indicate
- Nothing it's normal
 - Acidosis
 - Alkalosis
 - Neutral
19. An abnormal accumulation of interstitial fluid is termed
- Inflammation
 - Necrosis
 - Edema
 - Hyponatraemia
20. What is the most significant inorganic plasma buffer?
- Phosphate
 - Albumin
 - Hemoglobin
 - Bicarbonate
21. Which of the following is the end product of protein metabolism?
- Urea
 - NH₃
 - Carbonic acid
 - Water
22. 1% urinary glucose increases urine specific gravity by
- 0.030
 - 0.010
 - 0.003
 - 0.004
23. Fish excrete their nitrogen in the form of
- Creatinine
 - Ammonia
 - Urea

- d) Uric acid
24. Birds excrete their nitrogen in the form of
- Creatinine
 - Ammonia
 - Urea
 - Uric acid
25. The normal pH of blood is
- 3.6 – 5.0
 - 5.6 – 7.0
 - 7.36 – 7.42
 - 7.0 -14
26. The buffering of blood is effected by
- $\text{HCO}_3/\text{H}_2\text{CO}_3$
 - Na^+
 - Phosphate ions
 - Plasma proteins
27. The following test (s) can be used to demonstrate presence of bile salts
- Froth test
 - Ictostix
 - Erchlich test
 - Hay's test
28. Metabolic acidosis is seen in
- An increase in rate and depth of breath
 - A decrease in rate and depth of breath
 - Excessive administration of sodium bicarbonate
 - Administration of substances whose metabolism produces H^+
29. The normal range for sodium in blood is
- 135 – 145 mmol/L
 - 3.8 – 5.0mmol/L
 - 6.8 – 10.0 mmol/L
 - 5.0 – 6.8 mmol/L
30. The chlorides
- Are cations of the intracellular fluids
 - Are anions of the extracellular fluid
 - Are cations of the extracellular fluid
 - Have a normal plasma range of 95-105mmol/L
31. How does alcohol function as diuretic?
- Alcohol dilutes the blood and thus enable increased urine output
 - Alcohol receptors in the liver sense it's presence and trigger a biochemical pathway that increases urine output to rid the body of alcohol

- c) Alcohol inhibits the release of ADH and thus urine output is increased
- d) Alcohol prevents the distal convoluted from reabsorbing water from the filtrate.

32. Match the following with the correct chemical formula:

- i) Weak base
 - ii) Weak acid
 - iii) Strong acid
 - iv) Strong base
- a. $\text{NaHCO}_3 = \text{(i)}$
 - b. $\text{H}_2\text{CO}_3 = \text{(ii)}$
 - c. $\text{HCl} = \text{(iii)}$
 - d. $\text{NaOH} = \text{(iv)}$

33. What is the name of the condition of low K^+ (potassium) levels in the ECF?

- a) Hyperkalemia
- b) Hypokalemia
- c) Hypernatremia
- d) Hyponatremia

34. The main buffer system for blood is the carbonic / Bicarbonate buffer which is at a ratio of 20:1

- a) Is at a ratio of 20:1
- b) Is at a ratio of 1:20
- c) Maintains blood at pH 7
- d) Is at a ratio of 5:1

SECTION B ESSAY (60MARKS) Answer all questions

Question ONE

- a) Describe the following terms and give causes of each
 - (i) Oliguria (5marks)
 - (ii) Anuria (5marks)
- b) Outline the following
 - (i) The characteristics of direct bilirubin (5marks)
 - (ii) The characteristics of indirect bilirubin (5marks)

Question TWO

- a) Describe diseases correlated with high uric acid levels in blood (5marks)
- b) The principle of creatinine estimation using the Jaffe reaction (5marks)
- c) Describe pre- and post renal causes of elevated blood urea levels (10marks)

Question THREE

- a) Describe how water intake and output regulates body fluids **(10marks)**
- b) Outline diseases associated with low chloride levels **(5marks)**
- c) Outline functions of body electrolytes **(5marks)**