THE KENYA POLYTECHNIC UNIVERSITY COLLEGE

SCHOOL OF HEALTH SCIENCES AND TECHNOLOGY

DEPARTMENT OF BIOMEDICAL LABORATORY SCIENCES AND TECHNOLOGY

DIPLOMA IN MEDICAL LABORATORY SCIENCE

END OF YEAR 1 EXAMINATION

HAEMATOLOGY

TIME: 3 HOURS

INSTRUCTIONS

This paper consists of TWO SECTIONS: A and B.

Answer ALL questions in SECTION A and B.

Circle the letters of ALL correct answers in each multiple choices questions

Any wrong answer for multiple choices will be penalized (0.5 marks)

SECTION A (40 MARKS)

1. The primary site of hematopoiesis in the fetus between the 10^{th} and 20^{th} week of gestation is the
    a) Lymph nodes
    b) Bone marrow
    c) Thymus
    d) Liver

2. Active blood cell producing marrow begins to regress in the fourth year of life and is replaced by ;
    a) bones
    b) Fat
    c) Fibrous tissue
    d) collagen

3. The major erythrocyte production site is the
    a) bone marrow
    b) Kidney
    c) Liver
    d) spleen

4. Most of erythrocyte energy comes from
    a) Embden- Meyerhof pathway
    b) Pryvate hexose Rapport-Luebering shunt
    c) Hexose monophosphate shunt
    d) Methaemoglobin reduction pathway

5. The major site for the removal of normal, aged erythrocytes is the
    a) Bone marrow
    b) Kidney
    c) Liver
    d) Spleen

6. An increased MCV is associated with;
    a) Macrocytic anaemia
    b) Microcytic anaemia
    c) Normocytic aneamia
    d) Iron defiency anemia

7. Which one of these statements is NOT TRUE concerning erythropoietin?
    a) 90% of the hormone is made in the liver.
    b) One stimulus to production is a low atmospheric oxygen level
    c) It contains a hypoxia response gene.
    d) Levels in blood are high if there is a tumour secreting erythropoietin is causing polycythaemia but are low in severe renal disease.

8. Haemoglobin molecule

    a) Contains 1 atom of iron

b) Is broken down by Reticulo endothelial system

c) Is in very low levels at birth compared to adult life

d) Is determine by the origin of individuals

9. Embden-Meyerhof pathway produces the following **except**
    a) ATP
    b) 2,3DPG
    c) NADH
    d) ADP
10. During cell development the following changes take place in the nucleus

    a) The nucleus increases in size with maturity
    b) The chromatin pattern becomes fine and smooth with maturity
    c) Nucleoli disappear with maturity
    d) The nuclear gains round and large vacuoles as the cells mature.
11. Causes of neutrophilia include

        a) Viral infections
        b) Parasitic infections
        c) Agranulocytosis
        d) Emotional stress

12. Platelet diluting fluid include

    a) Hayems fluid
    b) Turks fluid
    c) Formal citrate
    d) Baars fluid

13. 2% sodium metabisulphite

    a) is used in testing for sickle cells in blood
    b) change Hb A to Hb S
    c) lyse red blood cells
    d) saturate red blood cells with oxygen

14. Eosinophilia is commonly found in;-

    a) Aplastic anaemia
    b) Viral infections
    c) Bacterial infections
    d) Parasitic infections

15. The following refer to HB F
    a) It is an inactive haemoglobin
    b) It is resistant to alkaline denaturation
    c) It has low affinity to oxygen
    d) It is adult haemoglobin

16. When a patient has reticulocytosis the blood film will show
    a) Macrocytosis
    b) Orthochromasia
    c) Microcytosis
    d) Hypochromasia
17. An improved Neubaur Counting chamber has a depth of
    a) 1mm
    b) 0.1mm
    c) 1cm
    d) 0.1cm
18. The highest dilution achieved in a WBC diluting pipette is;
    a) 1:10
    b) 1:20
    c) 1:200
    d) 1:100
19. MCV of a sample of blood with a PCV of 45% and erythrocyte count of $5.00X10^{12}$/L is;
    a) 30pg
    b) 33.3%
    c) 90fl
    d) 15g/dl

20. Hemoglobin affinity for O_2 is regulated by

    a) heme
    b) globin
    c) iron
    d) 2,3-DPG
21. Effective function of the red blood cell depends on the following **EXCEPT**:

    a) Negative surface charge to permits it to repulse other circulating cells
    b) Its unique tear drop shape
    c) Its ability to prevent oxidative stress to the hemoglobin molecule
    d) Maintenance of the four iron atoms on each hemoglobin molecule in the ferrous (Fe3+) state

22. The following are normal forms of Hgb
    a) Cyanmethaemoglobin
    b) Oxyhaemoglobin
    c) Methaemoglobin
    d) Carboxyhaemoglobin

23. The following are white blood cell diluting fluids
    a) Hayems fluid
    b) Ammonium sulphate
    c) Formal citrate
    d) Turks fluids
24. Ammonium Oxalates is a
    a) platelets diluting fluid

b) Red blood diluting fluid
c) WBC diluting fluid
d) Anticoagulant

25. Drabkins solution is a
    a) Diluents used in Hb estimation
    b) A Platelet diluting fluid
    c) Red blood diluting fluid
    d) Anticoagulant

26. The following dyes are used for the demonstration of reticulocytes

    a) Giemsa stain
    b) Carbol fuchsin
    c) Brilliant cresyl blue
    d) Eosin

27. The formula for calculating MCHC is;

    a. $\frac{Hb}{RBC} \times 10$
    b. $\frac{Hb}{PCV} \times 10$
    c. $\frac{Hb}{PCV} \times 10$
    d. $\frac{Hb}{Hb} \times 10$

28) . The presence of a ragged tail on a prepared thin blood film is due to

    a) Poor speader

    b) Greasy slides

    c) Clotted plasma proteins

    d) Narrow speader

29)The process of erythropoiesis is governed by

a) The rate of oxygen delivery to tissues

b) The amount of Fe^{3+} in the Hb Molecule.

c) Heart and other organs outside the bone marrow

d) A hormone produced by the liver

30) Anemia is defined as;

    a) a reduction in Hb, Hct and RBC Count.

b) Total Low count of platelets and white blood cells
c) Low Red blood cell count in high plasma volume
d) High oxygen carrying capacity of red blood cells

31) Pernicious anaemia is caused by a
a) Dietary folate defiency.
b) Dietary vitamin B_{12} defiency.
c) Reduced intrinsic factor secretion in the stomach
d) Defective intrinsic factor molecule

32) Hb that are composed of four alpha chain and four beta chain is
a) Hb A
b) Hb B
c) Hb F
d)Hb A_2

33) At the time of diagnosis of chronic blood loss, the red blood cells may be described as
a) Microcytic ,hypochromic
b) Macrocytic,hyperchromic
c) Normocytic normochromic
d) Macrocytic hypochromic

34) Hypersegmentated neutrophils has
a) 1-2 nuclear lobes
b) 3-6 nuclear lobes
c) 7-10 nuclear lobes
d) 0-1 nuclear lobes

35 An erythrocyte with marked variability in size (microcyte) can be best identified by;
a) Increased MCV
b) Decreased MCV
c) Increased MCHC
d) Decreased PCV

36) Relative erythrocytosis is caused by;
a) Decreased in plasma volume
b) Increased in plasma volume
c) Decreased in red cell mass
d) Increased in red cell mass

37) A false increase in the erythrocyte sedimentation rate value can be caused by
a) Slight tilting of the ESR tube rack
b) Reading the ESR value after exactly 30 min.
c) Overanticoagulation of the blood specimen
d) Cold room temperatures

38) Which of the following reference ranges are correct for an adult male
a) Hb= 11-17g/dl
b) PCV= 33-37%

c) MCHC=31-37g/dl
d) MCV=100-105Fl

39) the hemoglobin (Hb) structure includes all of the following EXCEPT
a) Protoporphyrin IX
b) Polypeptide chains
c) Transferrin
d) Iron

40) Normal red blood cells have a life span of
a) 8 days
b) 5 days
c) 28 days
d) 120 days

SECTION B(60 MARKS)

Q1) Outline
a) Factors that affect ESR estimation. (10marks)
b) Coulter Principle on automated blood cell analysis. (10 Marks)
c)

Q2) Outline classification anemia. (20 marks)

Q3) Describe Romanowsky stains also outline the principle behind staining of blood film. (20marks)