



**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 10th and 20th 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) Private 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 deficiency 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 determined 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 nucleus 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) Hayem's fluid
- b) Turk's 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
- Macrocytosis
 - Orthochromasia
 - Microcytosis
 - Hypochromasia
17. An improved Neubaur Counting chamber has a depth of
- 1mm
 - 0.1mm
 - 1cm
 - 0.1cm
18. The highest dilution achieved in a WBC diluting pipette is;
- 1:10
 - 1:20
 - 1:200
 - 1:100
19. MCV of a sample of blood with a PCV of 45% and erythrocyte count of $5.00 \times 10^{12}/L$ is;
- 30pg
 - 33.3%
 - 90fl
 - 15g/dl
20. Hemoglobin affinity for O_2 is regulated by
- heme
 - globin
 - iron
 - 2,3-DPG
21. Effective function of the red blood cell depends on the following **EXCEPT**:
- Negative surface charge to permits it to repulse other circulating cells
 - Its unique tear drop shape
 - Its ability to prevent oxidative stress to the hemoglobin molecule
 - Maintenance of the four iron atoms on each hemoglobin molecule in the ferrous (Fe^{2+}) state
22. The following are normal forms of Hgb
- Cyanmethaemoglobin
 - Oxyhaemoglobin
 - Methaemoglobin
 - Carboxyhaemoglobin
23. The following are white blood cell diluting fluids
- Hayems fluid
 - Ammonium sulphate
 - Formal citrate
 - Turks fluids
24. Ammonium Oxalates is 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. $\frac{\text{Hb} \times 10}{\text{RBC}}$
- b. $\frac{\text{Hb} \times 10}{\text{PCV}}$
- c. $\frac{\text{Hb} \times 10}{\text{PCV}}$
- d. $\frac{\text{Hb} \times 10}{\text{Hb}}$

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

- a) Poor spreader
- b) Greasy slides
- c) Clotted plasma proteins
- d) Narrow spreader

29)The process of erythropoiesis is governed by

- a) The rate of oxygen delivery to tissues
- b) The amount of Fe³⁺ 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 deficiency.
- b) Dietary vitamin B₁₂ deficiency.
- 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 A₂

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)

