MOI UNIVERSITY

COLLEGE OF HEALTH SCIENCES
SCHOOL OF NURSING AND MIDWIFERY

FIRST YEAR END OF TERM THREE EXAMINATION (ETE III)
2022/2023 ACADEMIC YEAR

COURSE TITLE: BLOOD, BODY FLUID AND CARDIOVASCULAR SYSTEM

COURSE CODE: NSB 113

PROGRAMME: **BSc. NURSING** YEAR OF STUDY: **ONE**

DATE: 13TH NOVEMBER, 2023 **TIME:** 9.00A.M–12.00P.M

Forces acting on the lungs.
Keeping alveoli open. 1. Preventing collapse.
② Transmural pressure grad. ② Elasticity of stretched pulmonary fibres
③ Surfactant
④ Alveolar interdependence. ⑤ Alveolar tension
Alveolar ventilation = (Tidal volume - Dead space) X RR (Respiratory rate).
= (500 - 150) X 12 (varies).

SECTION A: MEDICAL BIOCHEMISTRY

SECTION B (i): MULTIPLE CHOICE QUESTIONS (MCQs) TYPE III (20 MINUTES)

1. Mucopolysaccharides are:
   a) Hamopolysaccharides
   b) Hetropolysaccharides
   c) Proteins
   d) Glycoproteins
   e) Amino acids

2. Synovial fluid contains:
   a) Heparin
   b) Hyaluronic acid
   c) Chondroitin sulphate
   d) Keratin sulphate
   e) Hemopolysaccharide

3. The glycosaminoglycan which does not contain uronic acid is:
   a) Hyaluronic acid — Answer
   b) Heparin
   c) Chondroitin sulphate
   d) Dermatan sulphate
   e) All the above

4. The repeating unit in hyaluronic acid is:
   a) Glucoronic acid and galactosamine
   b) Glucoronic acid are gulucosamine
   c) Glucoronic acid and N-acetyl glucosamine
   d) Glucoronic acid and iduronic acid
   e) Glucoronic acid and N-acetyl galactosamine

5. Keratin sulphate is found in abundance in:
   a) Heart muscle
   b) Liver
   c) Adrenal cortex
   d) Cornea
   e) Synovial fluid

6. Proteoglycans are made up of protein and:
   a) Glucosamine
   b) Mannosamine
   c) Sialic acid
   d) Mucopolysaccharides
   e) Uronic acid

7. The following are functions of blood EXCEPT:
   a) Transporting waste products
   b) Transporting gases
   c) Transporting nutrients
   d) Cellular respiration
   e) Helping removal of toxins from the body

8. The tetrapyrote ring consists of iron in which form?
   a) Ferrous state
   b) Ferric state
   c) Methylene bridges
   d) Magnesium
   e) Metallic state

9. Cylic molecule formed by linkage of four pyrole rings through methyl bridges is referred to as:
   a) Vinyl
   b) Propionyl
   c) Porphrin
   d) Acetyl
   e) Methyl

10. During heme synthesis, 8 different enzymes are involved – last step is catalyzed by:
   a) Porphyrias
   b) Ferrochelatase
   c) Deaminase
   d) Decarboxylase
   e) Oxidase

11. The primary structure of collagen is normally represented by ~~e~~ely-X-Y. What amino acid does X usually stand for?

a) Glycine
b) Proline
c) Valine
d) Methionine
e) Tryptophan

12. What is the colour of elastin?

a) White
b) Grey
c) Yellow
d) Brown
e) Blue

13. How many elastin genes are found in humans?

a) One
b) Two
c) Three
d) Four
e) Many

14. In nature the keratins occur in what form?

a) α
b) β
c) δ
d) ʊ
e) Π

15. Fibroin is usually rich in which amino acid below?

a) Phenylalanine
b) Methionine
c) Tryptophan
d) Alanine
e) Cysteine

16. All of the following enzymes are involved in β- oxidation of fatty acids EXCEPT:

a) Ketothialase
b) EnoyL CoAhytratase
c) CoA dyhydrogenase
d) CoA synthetase
e) Ketoacyl reductase

17. The mechanism for utilization of ketone bodies requires the activity of:

a) CoA transferase
b) CoA hydratase
c) CoA synthetaze
d) CoA dehydrogenase
e) CoA carboxylase

18. Which of the following aspects of fatty acid oxidation is not correct?

a) It occurs in mitochondria
b) It requires coenxyme A
c) It generates ATP
d) It requires FAD
e) It requires NADPH

19. Which of the following catalyzes the convertion of acetoacetate to β hydroxybutyrate?

a) Hydroxybutarate dehydrogenase
b) CoA – carboxylase
c) HMG – CoA synthetase
d) Ketothiolase
e) HMG – CoA lyase

20. Which of the following aspects of fatty acid synthesis is NOT correct?

a) It requires ACP
b) It requires NADH
c) It consumes ATP
d) It requires CO_2
e) It occurs in the cytosol

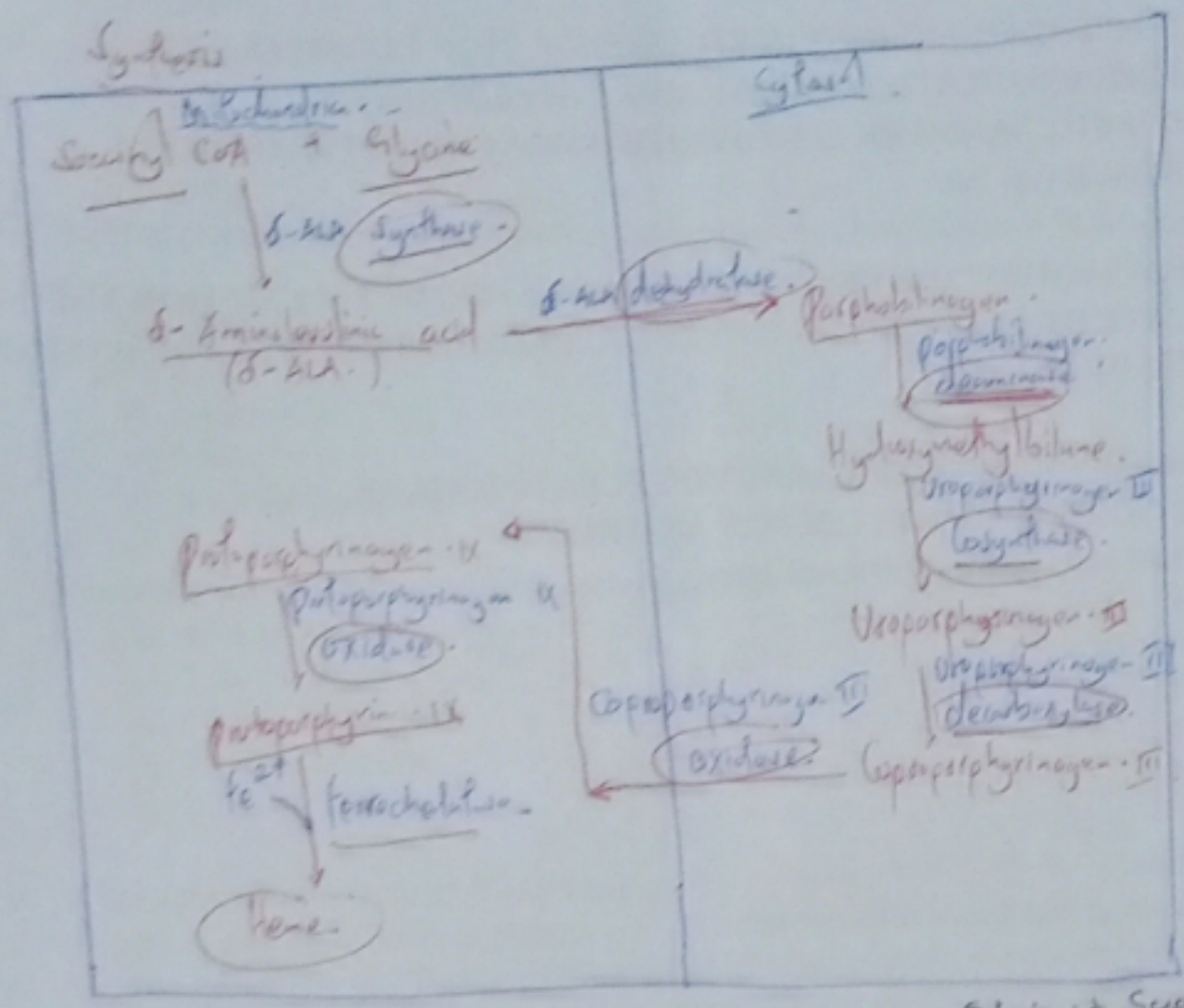
SECTION A (ii): SHORT ANSWER QUESTIONS (SAQ) (10 Minutes)

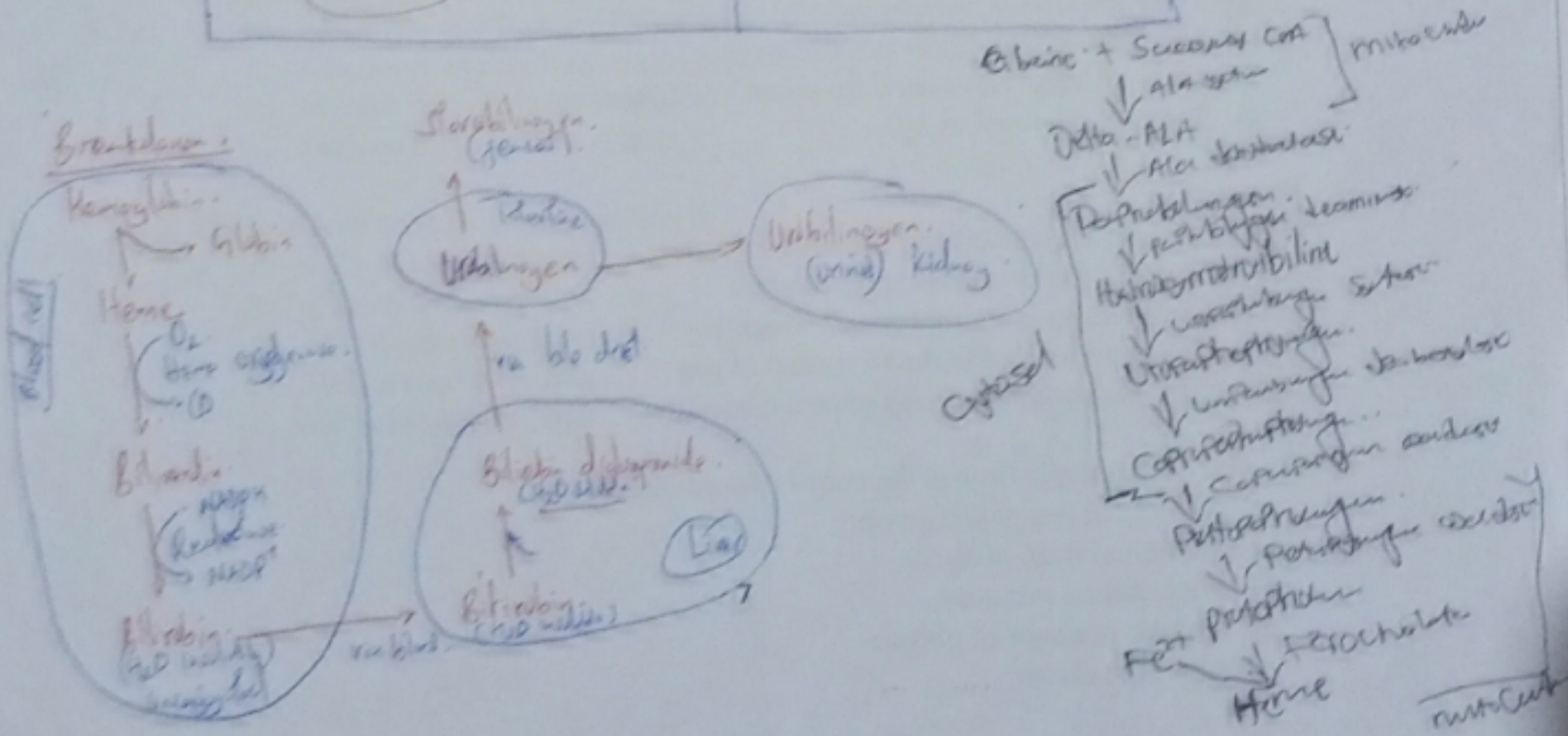
INSTRUCTIONS:

(I) **THERE IS ONE (1) QUESTIONS IN THIS SECTION**

(II) **ANSWER THE QUESTIONS**

SAQ 1. Describe heme synthesis in mitochondria and cytosol. **(10 marks)**





SECTION B: MEDICAL PHYSIOLOGY

SECTIOON B (i): MULTIPLE CHOICE QUESTIONS (MCQs) TYPE III (50 Marks)

INSTRUCTIONS:

(I) EACH OF THE QUESTIONS IN THIS SUBSECTION CONSISTS OF A STATEMENT/QUESTION WHOSE MOST APPROPRIATE COMPLETION/ANSWER IS PROVIDED AMONG THE FIVE OPTIONS NUMBERED (a) - (e).

(II) FOR EACH QUESTION SELECT THE MOST APPROPRIATE OPTION AND INDICATE BY PRINTING AN X IN THE APPROPRIATE BOX IN THE ANSWER SHEETS PROVIDED.

(III) A CORRECT RESPONSE EARNS YOU PLUS ONE MARK. ANY UNANSWERED OPTION COUNTS AS WRONG.

1. The normal percentage of neutrophils is:
   a) 50 – 70%
   b) 20 – 40%
   c) 02 – 08%
   d) 1%
   e) <5%

2. Neutrophils: - endocrine and phagocytic.
   a) Develop into tissue macrophage
   b) Their life span is circulation is 10 to 12 hours.
   c) Their life span in tissue is 4 to 5 days
   d) Their life span can extend for months and years
   e) They are attracted to IgE

3. Eosinophils:
   a) They are responsible for acquired immunity
   b) They may be processed in the thymum
   c) The nucleaus is mutilobed and irregular
   d) They are included in the formation of pus
   e) They are produced during parasitic injections

4. The rate of lymphatic flow in the body is determined by:
   a) Activity of lymphatic pump
   b) Interstitial fluid pressure
   c) Pre capillary pressure
   d) Oncotic pressure of plasma
   e) All of the above

5. Total body water can be measured by:
   a) Antipyrine
   b) Radioactive sodium
   c) Radioactive albumin
   d) Evans blue
   e) All of the above

6. Facial water loss in milliliters per day is:
   a) 100
   b) 700
   c) 200
   d) 1400
   e) 2500

7. The first clotting factor to be activated during extrinsic mechanism of blood coagulation is:
   a) Factor XII
   b) Factor VII
   c) Factor VIII
   d) Calcium
   e) None of the above

8. The extracellular fluid contributes approximately:
   a) 40% of TBW
   b) 50% of TBW
   c) 14 liters of TBW
   d) 28 liters of TBW
   e) 30 % of TBW

9. A person with blood group O will have:
   a) A and B antibody in plasma
   b) Antigen A and B on red blood cells
   c) Antigen A and B on red blood cell
   d) Antigen A on red blood cells
   e) Antigen B on red blood cells

10. The total iron content in haemoglobin is:
   a) 0.1% of total body iron
   b) 65% of total body iron
   c) 1 % of total body iron
   d) 30% of total body iron
   e) 50% of total body iron

11. Erythropoiesis is inhibited by:
    a) Hypoxia
    b) Anaemia
    c) Erythropoietin
    d) Polycythemia
    e) High altitude

12. Average blood volume of a normal adult is:
    a) 60% of total body weight
    b) 8% of total body weight
    c) 40% of total body weight
    d) 20% of total body weight
    e) 10% of total body weight

13. Red blood cell's energy pathway for the formation of ATP occur in:
    a) Nucleus
    b) Cytoplasm
    c) Mitochondria
    d) Endoplasmic reticulum
    e) None of the above

14. Time taken for the formation of red blood cells from proerythroblast is:
    a) 9 to 10 days
    b) 30 days
    c) 100 to 120 days
    d) 3 weeks
    e) 6 weeks

15. Each haemoglobin molecule can transport:
    a) 8 molecule of oxygen
    b) 2 molecule of oxygen
    c) 6 molecule of oxygen
    d) 4 molecule of oxygen
    e) 1 molecule of oxygen

16. During erythropoiesis, haemoglobin appearance occurs during:
    a) The stage of committed stem cell
    b) Pro erythroblast
    c) Intermediate normoblast
    d) Reticulocyte
    e) Late normoblast

17. Serum does not contain:
   a) Prothrombin
   b) Plasma thromoboplastin
   c) Ca^{2+}
   d) Factor VII
   e) Fibrinogen

18. Which of the following is the MOST important determinant of colloid osmotic pressure:
   a) Globulin
   b) Fibrinogen
   c) Prothrombin
   d) Albumin
   e) Haemoglobin

19. Which of the following is NOT synthesized in the liver?
   a) Globulin
   b) Prothrombin
   c) Fibrinogen
   d) Protein C
   e) Albumin

20. Which of the following biochemical is produced by platelets to cause vasoconstriction?
   a) Accelerator globulin
   b) Serotonin
   c) Histamine
   d) Thromboxane A2
   e) Bradykenin

21. Your blood pressure today is 100/70 mmHg. What is your mean arterial pressure (MAP)?
   a) 93
   b) 110
   c) 85
   d) 100
   e) 80

22. Your heart level mean arterial pressure (MAP) while standing for long is 80 mmHg. What would be the MAP in a large artery in your head, 40 cm above?
   a) 62 mm Hg
   b) 49 mm Hg
   c) 80 mm Hg
   d) 110 mm Hg
   e) 98 mm Hg

23. Concerning the circulatory system;

a) Pressure of blood in the pulmonary artery is normally equal to that in the aorta following systole
b) Pressure of blood in the left pulmonary vein is normally higher than in the pulmonary artery during diastole
c) Pressure of blood in the superior vena cava is normally lower than that in the right pulmonary artery
d) Pressure in the left pulmonary artery is lower than that in the inferior vena cava
e) Pressure in the right atrium overcomes that in the right ventricle during ventricular ejection.

24. Concerning the circulatory system;

a) Pressure of blood in the right pulmonary vein is higher than in the left pulmonary vein
b) Pressure of blood in the left pulmonary vein is higher than in the aorta during rest from exercise
c) Pressure of blood in the superior vena cava is higher than that in the right pulmonary artery
d) Pressure in the left pulmonary artery is higher than that in the inferior vena cava
e) Pressure in the right ventricle equates than in the left ventricle in a healthy 19 year old professional athlete.

25. Concerning normal systemic circulation;

a) The greatest blood pressure drop occurs at the capillary level
b) The 'windkessel' effect facilitates arterial blood flow during systole
c) The arterial PO_2 approximates 98 mmHg
d) A flow of 25 metre/second is considered normal in the brachial artery.
e) Blood flow through the left coronary artery is greatest during systole.

26. The following statement is true regarding systemic circulation

a) Blood pressure the various vessels is inversely proportional to the total cross sectional area of the said vessels
b) Blood pressure the various vessels is directly proportional to the total cross sectional area of the said vessels
c) The velocity of blood in the capillaries is higher than that in the veins
d) The pressure of blood in the capillaries is higher than that in the veins
e) The velocity of blood in the venules equals that in the arterioles

27. The Capillary filtration coefficient;

a) Is decreased by an increase in capillary hydrostatic pressure.
b) Is increased by an increase in interstitial fluid hydrostatic pressure
c) Is increased by an increase in colloid osmotic pressure of interstitial fluid.
d) Is negligibly affected by the colloid osmotic pressure of plasma.
e) Is greater at the venular than arteriolar end of the capillary

28. Concerning filtration across the capillary membranes;

a) Capillary hydrostatic pressure facilitate movement of substances into the capillary
b) Hydrostatic pressure of interstitial fluid facilitate movement of substances into the interstitium
c) The colloid osmotic pressure of plasma facilitates holding fluid within the capillary
d) The colloid osmotic pressure of interstitial fluid facilitates movement of fluid into the capillary
e) The interstitial fluid osmotic pressure is largely responsible for the movement of fluid into the interstitium

29. The following are short-term vasodilator metabolites except

a) Histamine and adenosine
b) Nitrous oxide and prostacyclin
c) Bradykinin and ADP
d) Atrial natriuretic peptide and vasoactive intestinal polypeptide
e) Increased osmolarity and thromboxane A_2

30. Short-term dilation of the cardiovascular system:

a) May be achieved following vasopressin and lactate injection
b) May be achieved following epinephrine and vasoactive intestinal peptide injection
c) May be achieved following carbon-dioxide and endothelial derived relaxing factors injection
d) May be achieved following hypertonicity and nor-epinephrine injection
e) May be achieved following atrial natriuretic peptide and angiotensin II injection

31. The bainbridge reflex;

a) Is normally a response to increase in atrial pressures
b) Is normally a response to detected mean arterial pressures at the carotid sinus
c) Is normally a response to detected mean arterial pressures at the aortic arch
d) Is normally a response to detected mean arterial pressures at the brain
e) Is normally a response to increase in ventricular pressures

32. The baroreceptor reflex:
    a) Is also referred to as the Bainbridge reflex
    b) Detects Oxygen and carbon-dioxide levels in blood, adjusting flow accordingly
    c) Is variously referred to as the atrial reflex.
    d) Performs optimally when MAP decline below 60mmHg
    e) Utilizes stretch receptors found among others in the walls of the heart, carotid sinus and aortic arch

33. Concerning normal lung volumes and capacities:
    a) Tidal volumes of male and female with exact age and height are the same. 0.5 L.
    b) The expiratory reserve volume is equal to the inspiratory reserve volume
    c) The vital capacity is variously called the total lung capacity residual.
    d) Tidal volume peaks after five minutes of involvement in exercise remains.
    e) The vital capacity increase after five minutes of running from your hostels to the exam room. - reduced.

34. Concerning normal lung volumes;
    a) The expiratory reserve volume for a 19 year-old male student at rest is approximately 0.5 litres. 1.0L.
    b) The expiratory reserve volume for a 19 year-old female student at rest is approximately 2.2 litres. 0.7L.
    c) The inspiratory reserve volume is usually equal to the expiratory reserve volume at rest.
    d) The residual volume after maximal forced exhalation is approximately 0.1 litres. male 1.2L female 1.1L.
    e) Males may normally have an inspiratory reserve volume of up to 3.0 litres. 3.3L. and female 1.9L.

35. Considering normal breathing and the breathing cycle;
    a) Tidal volume increases with rising trans-pulmonary pressures
    b) Rising pleural pressures coincide with inspiration
    c) Contraction of inspiratory muscles create positive pressures in the chest cavity
    d) Lowest pleural pressure is at the end of expiration
    e) With very low transpulmonary pressures, the tidal volume may reach 1.1 litres in tall men

36. Your 20 year old class male class rep is 173cm tall. Upon undertaking a lung functions test, his volumes and capacities were said to be normal. The following was most likely;
    a) His tidal volume was 1.0 L 0.5
    b) His inspiratory reserve volume was 1.0 L 3.3L.
    c) His expiratory reserve volume was 3.3 L 1.0L.
    d) His vital capacity was 4.6 L 4.8L.
    e) His inspiratory capacity was 2.2 L 3.8L.

	male	female
TV	0.5 L	0.5 L
IRV	3.3 L	1.9 L
ERV	1.0 L	0.7 L
RV	1.2 L	1.1 L
V.C.	4.5 L	3.1 L
IC	3.8 L	2.4 L
Total	L.C. 2.2L	1.8L.

37. In Pulmonary circulation

a) The amount of blood pumped into pulmonary artery is about 50% that pumped into the aorta.
b) Pulmonary arterioles are constricted by standing from a sitting position
c) The systolic blood pressure is equal to that of the systemic circulation
d) The diastolic pressure is about 1/8 that of the systemic circulation
e) Blood flow greatest in the mid-region of the lung but least at base and apex

38. Physiologic dead space

a) Is normally less than anatomic dead space
b) Should normally be more than the anatomic dead space
c) Is equal to anatomic dead space minus alveoli not participating in gaseous exchange
d) May be contributed by alveoli not taking part in gaseous exchange
e) Is zero in health

39. Concerning the respiratory system, which of the following statements is true?

a) Ventilation is greater at the apex than base of the lung in a sitting position
b) Blood flow is greater at the base than apex in a person standing on his head with lower limbs up
c) A ventilation perfusion ratio above 0.8 denotes physiologic shunting
d) Increased O_2 in pulmonary arterioles is vasodilatory
e) Normal blood pressure in pulmonary circulation for an adult male is 120/80 mmHg

40. Concerning the respiratory system, which of the following statements is true?

a) O_2 is 20 times as soluble as Co_2 across the respiratory membrane
b) Partial pressure of Co_2 for a given concentration is about 1/20 that exerted by O_2.
c) Partial pressure exerted by a gas on a membrane is inversely proportional to the concentration of its molecules.
d) An RBC remains in a respiratory capillary for 0.75 milliseconds and requires only 0.1 milliseconds to bind 4 mol of O_2
e) An RBC remains in a respiratory capillary for 7.5 seconds and requires only 1 second to bind 4 mol of O_2

41. The Ventilation-Perfusion ratio (V/Q)

a) When $\geq$ 0.8, the pulmonary vein P O_2 may rise only slightly
b) When 0.8, the P CO_2 in pulmonary artery is 40 mmHg
c) When $<$ 0.8 leads to increased physiologic dead space
d) When $<$ 0.8 may contribute to 'wasted' alveolar ventilation
e) When $>$ 0.8 leads to inadequate ventilation.

42. The Ventilation-Perfusion ratio (V/Q)

a) When < 0.8, the pulmonary vein $P O_2$ rises
b) When 0.8, the $P CO_2$ in pulmonary vein is 40 mmHg
c) When < 0.8 leads to increased physiologic dead space
d) When > 0.8 the $P O_2$ in the left ventricle blood reaches 102 mm Hg
e) When < 0.8 leads to over-ventilation

43. Considering a pulmonary diffusing capacity at 100% of its normal value, the following would normally be observed on systemic gaseous partial pressures;

a) Decreased $P O_2$ of 100 in the pulmonary vein
b) $P CO_2$ of 46 in arterioles
c) $P O_2$ of 45 in the venous blood
d) $P CO_2$ of 40 aortic blood
e) $P CO_2$ of 100 in the pulmonary artery

44. Concerning partial pressures;

a) Air inspired at sea level has PO_2 of 116
b) Air expired at sea level has PO_2 of 100
c) PO_2 in the alveoli at sea level is 95
d) PCo_2 in expired air at sea level 46
e) PCo_2 within the alveoli is 40

45. Concerning partial pressures

a) Expired air has PCO_2 of 32 mmHg
b) Inspired air has PO_2 of 97 mmHg
c) Alveolar air has PO_2 of 100 mmHg
d) Right ventricular blood has PO_2 of 46 mmHg
e) PO_2 in the pulmonary veins is 75 mmHg

46. Concerning partial pressures

a) Expired air has PCO_2 of 47 mmHg
b) Atmospheric air has PO_2 of 100 mmHg
c) PCO_2 at the venular end of capillaries is 46 mmHg
d) PO_2 in the aorta is 104 mmHg
e) PO_2 in the systemic veins is 75 mmHg

47. Regarding the shift of the oxygen- haemoglobin dissociation curve;

a) Binding of O_2 to hemoglobin increases its affinity for Co_2, shifting the curve to the right
b) The Haldane effect entails shifting the curve to the right
c) A patient who has just had his prescribed one-hour of continuous exercise will have his curve shift to the left
d) Ascent to higher altitudes contributes in shifting the curve leftwards.
e) A shift to the right may be a result of increased 2,3-diphosphoglycerate in red blood cells.

48. As blood passes through systemic capillaries;

a) Hb affinity for O_2 decreases and the dissociation curve shifts to the right
b) Hb affinity for O_2 decreases and the dissociation curve shifts to the left
c) Hb affinity for O_2 increases and the dissociation curve shifts to the right
d) Hb affinity for O_2 increases and the dissociation curve shifts to the left
e) Hb affinity for O_2 increases and the dissociation curve shifts to either left of right, depending on altitude.

49. A physiologic shunt

a) Occurs when V/Q ratio is more than 0.8 - physiology - dead space. - Inadequate ventilation.
b) May result from bronchial artery blood mixing with pulmonary vein blood - Oxygenated blood not reaching
c) Is as a result of inadequate flow of blood - physiology - dead space. Q - Blood flow.
d) Leads to 'wasted' alveoli ventilation - Dead space.
e) Is variously referred to as physiologic dead space - V/Q mismatch V - Airflow. - flow 0.8.

50. Concerning chemical regulation of respiration

a) CO_2 crosses the blood brain barriers more easily compared to H^+ ✓
b) CO_2 stimulates the chemosensitive area less powerfully compared to H^+
c) Arterial PO_2 plays no role
d) Arterial PO_2 is the single-most important factor in central chemoreceptor system regulation
e) The central (peripheral) chemoreceptor system responds best at blood PO_2 less than 60 mm Hg, and ceases when it is above 80 mm Hg.

SECTION B (ii): SHORT ANSWER QUESTIONS (SAQs) (10 Minutes)

SAQ 1. Explain the fate of haemoglobin after 120 days. **(5 minutes)**

SAQ 2. Briefly discuss ABO blood grouping and transfusion reactions. **(5 minutes)**

SECTION C: HUMAN ANATOMY (45 MINUTES)

SECTION C (i): MULTIPLE CHOICE TYPE I (15 Minutes)

INSTRUCTIONS:

(I) The following complete statements are either "True" or "False"

(II) Indicate by putting an X in the appropriate box of the answer sheet

(III) Put an X in the T column if the statement is "True" or an X in the F column if the statement is "False"

1. Conchae are bony plates covered with mucous membrane.
2. Olfactory area is found on the floor of the nose.
3. The nose is only concerned with filtering and conducting air to the lungs.
4. The pharynx is divided into nasopharynx and oropharynx only.
5. The pharynx connects with the larynx and esophagus superiorly.
6. The outer circular muscles of the pharynx consist of the superior, middle and inferior constrictors.
7. Tonsils are located on the lateral wall of the oropharynx.
8. The epiglottis is one of the paired cartilage of the larynx.
9. Extrinsic muscles of the larynx play a crucial role in voice production.
10. The sternum, costal cartilages and the ribs form the posterior boundary of the thoracic cage.
11. There are 12 thoracic vertebrae and all are connected to the sternum by the 12 ribs.
12. The 8^{th}, 9^{th} and 10^{th} ribs are called false ribs.
13. A true rib is one that is connected to the vertebra and the sternum.
14. The internal intercostal muscle depresses the rib during expiration.
15. The neurovascular bundle splits the internal intercostal muscle into two the internal intercostal proper and the innermost intercostal muscle.
16. There are nine pairs of anterior intercostal arteries and eleven posterior intercostal arteries.
17. The venous drainage of the chest wall is by way of the azygous system of veins.
18. The mediastinum is the part of thorax between the pleural cavities.
19. The mediastinum is divided into superior and inferior parts by the diaphragm.
20. The heart and the pericardium are contents of the posterior mediastinum.
21. The esophagus is anterior to the trachea.

22. The esophagus has a thoracic part only.
23. The thoracic duct drains lymph from the whole body except from the right upper limb, right halves of the thorax, head and neck.
24. The pleura has two parts the visceral and parietal pleura where the parietal layer of the pleura invests the lungs.
25. The parietal and the visceral layers of the pleura are separated by a space called the pleural cavity.
26. The lungs are organs of respiration and are attached to the heart and trachea at its root.
27. The hilus of the lung is the part of the lateral surface where structures enter or leave the lung.
28. Bronchopulmonary segment is that unit of the lung supplied by a third order bronchus. The blood supply to the heart is by way of the left and right coronary arteries.
29. Most of the venous drainage of the heart is by way of coronary sinus.
30. The pericardium is a fibrous sac that invests the lungs and the vessels at the hilum.

SECTION C (ii): MULTIPLE CHOICE TYPE TWO (II) (TRUE OR FALSE) (30 Minutes)

INSTRUCTIONS:

I. **EACH OF THE STEM STATEMENT IS FOLLOWED BY FIVE OPTIONS EACH OF WHICH IS TRUE (T) OR FALSE (F).**

II. **INDICATE YOUR ESPONSE BY PRINTING AN X IN THE 'T' or 'F' ROW WHICHEVER IS APPROPRIATE**

Eg Q concerning the eye

A. **Constrictor pupillae is supplied by sympathetic nervous system**
B. **Bipolar cells make second order of neurons in the visual pathway**
C. **Rods are absent in fovea centralis**
D. **Blockage of canal of Schlemm will result in increased intraocular pressure**
E. **Superior oblique muscle elevate and laterally rotate the eye**

		A	B	C	D	E
Q	T		*X*	*X*	*X*	
	F	*X*				*X*
1	T					
	F					

1. Contents of superior mediastinum include:
   a) Arch of the aorta
   b) Inferior venacava
   c) Right subclavian artery
   d) Brachiocephalic trunk
   e) Left common carotid artery

2. Contents of the inferior mediastinum include:
   a) Internal mammary vessels
   b) Heart
   c) Remains of the thymus gland
   d) Azygous veins
   e) Esophagus

3. Contents of anterior mediastinum include:
   a) Remains of thymus gland
   b) Thyroid gland
   c) Internal mammary vessels
   d) Sternopericardial ligaments
   e) Sternocostal muscles

4. Contents of middle mediastinum include:
    a) Arch of the aorta
    b) Heart
    c) Ascending aorta
    d) Trachea
    e) Main bronchi
5. Concerning the esophagus:
    a) Commences at the cricoid cartilage at C4
    b) Pierces diaphragm at the level of T8
    c) Has an abdominal part only
    d) The trachea is an anterior relation
    e) As it descends to the abdomen in midline its more inclined to the right

6. Concerning thoracic duct drainage:
    a) Thoracic duct commences on the upper end of cysterna chyli at level of T12
    b) Crosses from the right side to the left side at level of T4
    c) Drains structures on the right side of body
    d) Contains valves that ensures bidirectional flow of lymph
    e) Drains into the point of confluence of the left internal jugular and subclavian veins

7. About the surface anatomy of the heart:
    a) The apex is in the 5^{th} intercostal plane midaxillary line
    b) Right lower border is usually at the right 6^{th} costal cartilage
    c) Left upper border is located at the lower border of the left 2^{nd} costal cartilage
    d) Right upper border is located at the right 3^{rd} costal cartilage
    e) The apex is at the 6^{th} intrcostal space on the right side

8. Concerning the blood supply of the heart:
    a) By coronary artery
    b) Coronary artery arise directly from the heart
    c) Coronary aertry arise from the coronary sinus
    d) Most venous drainage is via coronary sinus
    e) Some veins drain directly to the heart

9. Concerning the pericardial sac:
    a) The pericardial sac and its content comprises the inferior mediastinum
    b) The fibrous pericardium lubricates the moving surfaces of the heart
    c) The outer layer is fibrous
    d) The endocardium completely invests the heart
    e) The pericardial sac is fused to the central tendon of the diaphragm

10. A bronchopulmonary segment:
    a) Is supplied by a second order bronchus
    b) Is supplied directly by a main bronchus
    c) Has clinical importance in surgical removal of part of the lung
    d) Disease process don't tend to localize on the segments
    e) Defines the functional unit of the lung

11. Concerning the diaphragm:
    a) Concave upper surface forming the floor of the thoracic cavity
    b) Convex undersurface forming the roof of the abdominal cavity
    c) Main inspiratory muscle
    d) Has a sternal insertion
    e) The aortic opening is at the level of T10

12. Concerning the pharynx:
    a) Top most opening anteriorly is the oropharynx
    b) Superiorly attached to the body of sphenoid and occipital bones
    c) Continuous below with the trachea and oesophagus
    d) Posteriorly lies along the thoracic portion of the vertebra
    e) Laterally communicates with middle ear through the tympanitic tube

13. Concerning the muscles of the pharynx:
    a) Insertion of the inferior constrictor include Oblique line of thyroid cartilage (Thyropharyngeus) and the side of cricoid cartilage (Cricopharyngeus)
    b) The glossopharyngeal nerve and stylopharyngeus muscle pass between the superior and inferior constrictor muscles
    c) Origin of the superior constrictor includes the posterior border of medialpterygoid plate, Pterygoid hamulus, Pterygomandibular raphe, Posterior end of mylohyoid line and Side of the tongue.
    d) Origin of the middle constrictor include Lower part of stylohyoid ligament and Lesser and greater corns of hyoid bone
    e) Recurrent laryngeal nerve and inferior laryngeal vessels pass below the inferior constrictor muscle.

14. Concerning the cartilages of the larynx:
    a) The thyroid cartilage forms a posterior laryngeal prominence the Adams apple
    b) The cricoid cartilage is the only complete ring of cartilage in the larynx
    c) The thyroid, cricoid and epiglottis are unpaired cartilages
    d) The unpaired arytenoids, cuneiform and corniculate cartilages are involved in voice production
    e) The epiglottis protects the airway when swallowing

15. Concerning the intrinsic muscles of the larynx, the following are matched to the function:
    a) **Cricothyroid muscles** – tense the vocal folds to control pitch.
    b) **Posterior cricoarytenoid muscles** – the ONLY abductors of vocal folds.
    c) **Lateral cricoaryteniod muscles** and **Transverse arytenoid muscle** – adducts vocal folds.
    d) **Thyroarytenoid muscles** – relaxes vocal folds.
    e) **Vocalis muscles** – contraction affects frequency of vibrations and controls pitch.

SECTION C (iii): MULTIPLE CHOICE TYPE ~~TWO~~ (III) (TRUE OR FALSE) (30 Minutes)

INSTRUCTIONS:

I. EACH STEM STATEMENT IS PRECEEDED BY FIVE OPTIONS ONE OF WHICH IS RIGHT WITH RESPECT TO THE STEM STATEMENT

II. CHOOSE THE RIGHT COMPLETION OPTION IN EACH QUESTION AND INDICATE YOUR RESPONSE BY PRINTING AN X IN THE COLUMN CORRESPONDING TO THE QUESTION OF THE ANSWER SHEET PROVIDED

1. Which of the following clinical signs would be most obvious on examination of a patient with either tetralogy of Fallot or transposition of the great vessels?
   a) Sweaty palms
   b) Lack of femoral artery pulse
   c) Pulmonary hypertension
   d) Cyanosis
   e) Diffuse red rash

2. The most common atrial septal defect (ASD) seen clinically is:
   a) common atrium
   b) foramen secundum defect
   c) premature closure of the foramen ovate
   d) persistent truncus arteriosus
   e) probe patency of the foramen ovale

3. Which of the following arterial malformations is very common in premature infants?
   a) Patent ductus arteriosus
   b) Coarctation of the aorta
   c) Right aortic arch
   d) Double aortic arch
   e) Abnormal origin of the right subclavian artery

4. How soon after birth does the foramen ovale close?
   a) 1-2 months
   b) 1-2 weeks
   c) 1-2 days
   d) 1-2 hours
   e) Immediately

5. Which part of the heart conduction system branches and stimulates the contraction of ventricular musculature?
   a) Sinoatrial node.
   b) Purkinje fibers.
   c) Internodal pathway.
   d) Atrioventricular bundle.
   e) Atrioventricular node.

6. Purkinje fibers are recognized histologically by:
   a) Containing more contractile filaments.
   b) Their location deep in the heart musculature.
   c) Being larger and thicker than the cardiac cells.
   d) Having little glycogen in their cytoplasm.
   e) Containing granules in their cytoplasm.

7. The epicardium is one of the three layers of the heart. It is
   a) Continuous with the endocardium.
   b) Also known as the visceral pericardium.
   c) Composed of modified cardiac muscle cells.
   d) Capable of increasing intraventricular pressure.
   e) Capable of decreasing the rate of contraction.

8. Which of the following characteristics distinguishes somatic capillaries from visceral capillaries?
   a) Presence or absence of fenestrae
   b) Size of the lumen
   c) Thickness of the vessel wall
   d) Presence or absence of pericytes
   e) Thickness of the basal lamina

9. Vasa vasorum function in a way that is similar to
   a) AV valves
   a) Semilunar valves
   b) Coronary arteries
   c) Elastic arteries
   d) Metarterioles

10. Which one of the following possesses a distinct internal elastic lamina?
   a) Capillary
   b) Metarteriole
   c) Arteriole
   d) Muscular artery
   e) Vein

11. The trachea is lined with pseudostratified ciliated columnar epithelium with goblet cells. This epithelium is derived from
    a) neuroectoderm
    b) endoderm
    c) ectoderm
    d) visceral mesoderm
    e) mesoderm of fourth and sixth pharyngeal arches

12. Smooth muscle, connective tissue, and cartilage of primary bronchi are derived from which one of the following sources?
    a) Neuroectoderm
    b) Endoderm
    c) Ectoderm
    d) Visceral mesoderm
    e) Mesoderm of pharyngeal arches 4 and 6

13. Components of the blood–air barrier in the lung are derived from which of the following sources?
    a) Ectoderm only
    b) Visceral mesoderm only
    c) Visceral mesoderm and ectoderm
    d) Endoderm and ectoderm
    e) Visceral mesoderm and endoderm

14. Development of which one of the following is the first sign of respiratory system development?
    a) Tracheoesophageal septum
    b) Hypobranchial eminence
    c) Primitive foregut
    d) Tracheoesophageal fistula
    e) Respiratory diverticulum

15. What is the main function of surfactant?
    a) To reduce air flow into the lung
    b) To increase air flow into the lung
    c) To reduce alveolar surface tension
    d) To reduce the alveolar lumina
    e) To decrease the blood–air barrier

16. Which cells serve as stem cells for renewing the olfactory epithelium?
    a) Goblet cells
    b) Sustentacular cells
    c) Ciliated cells
    d) Basal cells
    e) Connective tissue cells

17. Which of the following statements concerning terminal bronchioles is true?
    a) They are part of the conducting portion of the respiratory system.
    b) They function in gas exchange.
    c) They do not contain ciliated cells.
    d) They have cartilage plates present in their walls.
    e) They do not contain secretory cells.

18. The trachea possesses which one of the following components?
    a) Irregular cartilage plates in its wall
    b) Skeletal muscle in its wall
    c) An epithelium containing only two cell types
    d) A thick basement membrane underlying its epithelium
    e) Bowman glands in its lamina propria

19. Which of the following statements concerning respiratory bronchioles is true?
    a) No gas exchange occurs in them.
    b) They do not have alveoli forming part of their wall.
    c) They contain goblet cells in their lining epithelium.
    d) They are included in the conducting portion of the respiratory system.
    e) Ciliated cells comprise a portion of their lining epithelium.

20. True statements about asthma include which one of the following?
    a) It is due to a loss of lung elasticity.
    b) It eventually causes the lungs to expand and leads to a barrel chest.
    c) It is associated with difficulty expiring air from the lungs.
    d) It may be helped by gene therapy using recombinant α1-antitrypsin.
    e) It is usually not associated with inflammation.

SECTION D: IMMUNOLOGY (60 MARKS)

SECTION D (i): MULTIPLE CHOICE QUESTIONS (MCQs TYPE III) (20 Marks)

INSTRUCTIONS:

(I) **FOR THE MCQs, EACH QUESTION CONSISTS OF A STATEMENT/STEM WHOSE MOST CORRECT COMPLETION OR ANSWER IS PROVIDED AMONG THE FIVE OPTIONS NUMBER A TO E.**

(II) **FOR EACH MCQ, SELECT ONLY ONE APPROPRIATE OPTION AND INDICATE BY CIRCLING IT.**

EXAMPLE:

Major features of innate immunity include
(a) Recognition
(b) Specificity
(c) Memory
(d) First line of defense
(e) Adaptability
The appropriate response is (d)

(IV) **ATTEMP ALL QUESTIONS IN THE TWO SECTIONS.**

1. Edward Jenner is credited for:
   a) Introduction of first attenuated virus vaccines
   b) Experimented cowpox leading to smallpox vaccine
   c) Discovery of human ABO blood group system
   d) Maternal transfer of species specific immunity to infant through colostral milk
   e) Identification of lysozyme enzymes

2. The following confer anatomical innate defense barrier against microorganisms:
   a) Intact skin
   b) Low PH
   c) Temperatures
   d) Chemical mediators
   e) Soluble mediator

3. Determinants of innate immunity EXCLUDE:
   a) Species and strains
   b) Humoral immunity
   c) Age
   d) Hormonal influences
   e) Nutrition

4. Mechanisms of innate immunity EXCLUDE:
   a) Epithelial surfaces
   b) Antibacterial substances in blood and tissues
   c) Haptens
   d) Inflammation
   e) Fever

5. Adaptive immunity is NOT associated with:
   a) Memory of prior exposure exists
   b) Inborn pattern recognition receptors (PRR) recognize pathogens
   c) Randomly generated receptor recognize pathogens
   d) Response is generally slow
   e) Pathogens associated molecular pattern (PAMPs) display narrow specificity

6. Antibodies are produced by:
   a) Plasma cells
   b) T cells
   c) B cells
   d) B and T cells
   e) NK cells

7. Which of these immunoglobulins crosses the placenta?
   a) IgA
   b) IgM
   c) IgG
   d) IgE
   e) IgD

8. J chain is found in:
   a) IgE
   b) IgD
   c) IgG
   d) Both in IgG and IgD
   e) None of the above

9. All mature T cells that recognize peptides bound to self MHC class I molecules express:
   a) CD3/CD4 markers
   b) CD3/CD8 markers
   c) CD4 markers
   d) CD8 markers
   e) CD3/CD4/CD8 markers

10. The thymic cortical epithelial cell mediate:
    a) Negative selection process
    b) Positive selection process
    c) Both positive and negative selection process
    d) TCR development
    e) MHC class I molecule expression

11. The MOST polymorphic HLA class II genes are:
    a) HLA DP
    b) HLA DM
    c) HLA DRA
    d) HLA DRB
    e) HLA DQ

12. Which of the following statements does NOT describe characteristics of α β TCR?
    a) It is a membrane bound protein
    b) Affinity maturation and somatic hypermutal does not occur like in BCR
    c) Its α chain has variable and joining solu… only
    d) Its β chain is similar to the heavy chain of immunoglobulin
    e) It belongs to the Ig super gene family

13. Which of the following chromosome location matches the right gene in human genome?
    a) MHC class II genes – chromosome 6
    b) TCR β chain – chromosomes 7
    c) Ig heavy chain – chromosomes 14
    d) TCR α chain – chromosome 22
    e) Ig Kappa light chains – chromosome 2

14. CD4 molecule binds to:
    a) α3 domain of MHC class I
    b) α2 and β^2 domain of MHC class II
    c) α2 and α^3 domain of MHC class I
    d) α1 and β^2 domain of MHC class II
    e) α and δ of IEL

15. Ig supergene family EXCLUDE:
    a) ICAM
    b) TCR genes
    c) Heat shock proteins
    d) MHC genes
    e) FC receptor genes

16. Angioedema caused by complement system abnormality may be due to:
    a) Too much Ca
    b) Too much C5a
    c) Too little factor B
    d) Too little C3b
    e) Too little CI inhibitor

17. Regarding C 4, which one of the following is true?
    a) C4 binds and cleaves C5
    b) C4 binds only CLQ
    c) C4a fragment is an anaphylatoxin
    d) Detention of C4 alleles is associated with S.L.E
    e) C4 cleaves C2

18. Which of the following is observed only when complement is activated by the classical pathway?
    a) Activation of Cls
    b) Activation of C2
    c) Activation of MAC
    d) Breakdown of C3 into C3 into C3a and C3b
    e) Generation of anaphylatoxins

19. Which one is the most potent in attracting neutrophils to the site of infection?
    a) C1
    b) C2
    c) C3a
    d) C5a
    e) Mannan-binding lectins

20. Complement is fixed by:
    a) IgM (planner)
    b) IgA
    c) IgE
    d) IgG2
    e) IgG4

SECTION D (ii): SHORT ANSWER QUESTIONS (SAQs) (40 Minutes)

INSTRUCTIONS:

(I) THERE ARE FOUR (4) QUESTIONS IN THIS SECTION

(II) ANSWER ALL THE QUESTIONS

(III) START EACH QUESTION ON A FRESH PAGE OF THE ANSWER BOOKLET

SAQ 1. Discuss the major functions of IgG and IgM antibodies. **(10 minutes)**

SAQ 2. Explain the mechanism involved in T cell activation. **(10 minutes)**

SAQ 3. Illustrate the structure of MHC class II molecules. **(10 minutes)**

SAQ 4. Explain the biological functions of activated complement fragments. **(10 minutes)**