For BioResire students

NEET Biology Material

Elite Batch

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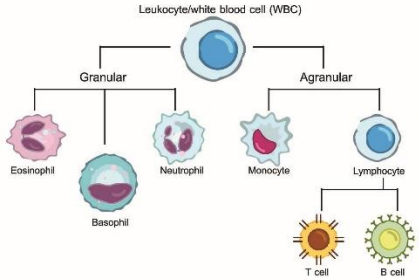
BLOOD

- Plasma
  - Albumin
  - Globulin
  - Fibrinogen
- Formed Elements
  - White Blood Cells
  - Red Blood Cells
  - Platelets



STRUCTURE OF HEART

- Mesoderm ally derived
- Protected by Pericardium Layer
- Chambers – Upper two auricles and Lower two ventricles
- Valves:- 1. Tricuspid (Between right atrium & right Ventricle
  2. Bicuspid:- (Between Left atrium and Left ventricle)
  3. Semilunar:- (At the opening of right & Left Ventricles into Pulmonary artery and aorta respectively)
- Nodes:- Sino – atrial node (SAN):- (At the right atrium's top right
  - Atrio – Ventricular node (AVN):- (At the right atrium's bottom Left Corner Close to the atrio – Ventricular Septum)

REGULATION OF CARDIAC ACTIVITY

Adrenal medullary hormone
Increase the Cardiac Output

ANS

Sympathetic nerve	Parasym-pathetic nerve
Increase rate of heart beat, the strength of ventricular contraction and the cardiac output	Decrease the heart-beat. Conduction of action Potential and the cardiac output

CARDIAC CYCLE

Cyclic Contraction and relaxation of heart for pumping blood

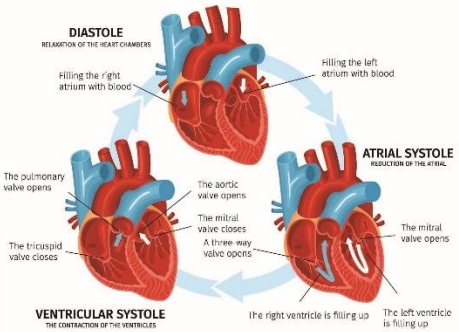
STAGES OF CARDIAC CYCLE

- Joint Diastole
- Atrial System
- Ventricular System

A cardiac cycle is completed in 0.8 seconds

One heartbeat is equal to a single cardiac cycle

Description of a cardiac cycle



1 heartbeat = A lub + A Dub

BLOOD GROUPS

ABO Grouping

Blood Group	Antigen	Antibodies	Can donate Blood to	Can receive blood from
A	A	Anti - B	A and B	A, O
B	B	Anti - A	B and AB	B, O
AB	A,B	Nil	AB only	A,B,AB and O
O	Nil	Anti -A and Anti - B	A,B,AB and O	O only

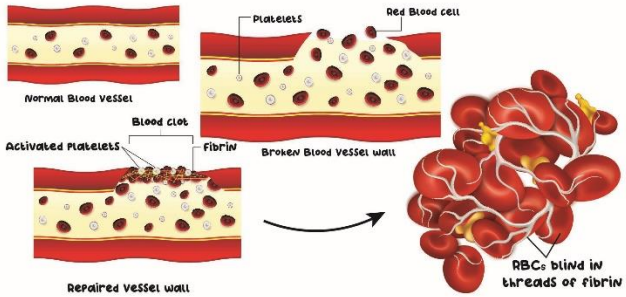
Rh Grouping

- Presence of Rh factor – Rh +ve
- Absence of Rh factor – Rh -ve

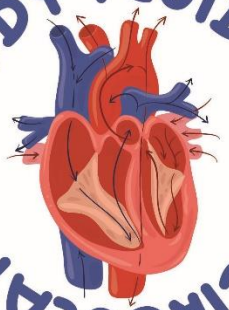
Erythroblastosis Fetalis is caused when fertilization takes place between gametes of Rh -ve female and Rh +ve male.

BLOOD COAGULATION

Mechanism for hemostasis (Prevention of blood loss)

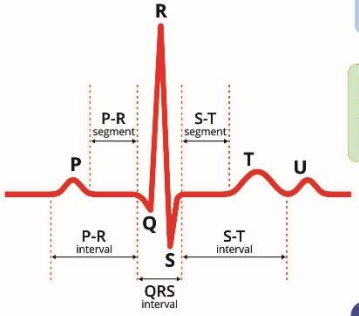


CIRCULATION BODY FLUIDS AND



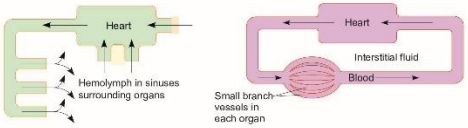
ECG ELECTROCARDIOGRAPH

P – wave | QRS – Complex | T – wave



CIRCULATORY PATHWAYS

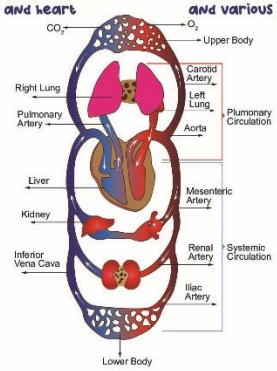
Open Circulatory System	Closed Circulatory System
Blood Pumped by heart flows freely through cavities or Sinuses	Blood Pumped by the heart is circulated through blood vessels



DOUBLE CIRCULATION

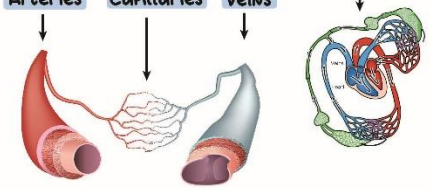
Pulmonary Circulation:- Circulation between Lungs and heart

Systemic Circulation:- Circulation between heart and various body parts.



HUMAN CIRCULATORY SYSTEM

- BLOOD VASCULAR SYSTEM
  - Heart
  - Blood
  - Blood Vessels
    - Arteries
    - Capillaries
    - Veins
- LYMPHATIC SYSTEM
  - Lymph
  - Lymph Vessels
  - Lymph Nodes



DISORDERS OF CIRCULATORY SYSTEM

Hypertension (High blood pressure)	Blood pressure above 120/80 mmHg
Fat, Ca, Cholesterol and fibrous tissue gets deposited in coronary arteries restricting blood flow	Coronary Artery Disease (CAD) or Atherosclerosis
Angina (Angina Pectoris)	Acute chest pain due to oxygen deficiency to heart muscles
Condition in which heart is not pumping blood enough to meet the needs of the body	Heart failure (Congestive heart failure)

BODY FLUIDS AND CIRCULATION

Blood

Blood, also known as connective tissue, is responsible for transporting oxygen, nutrients, hormones, respiratory gases, to the body, and waste materials away from it. The total volume of the blood in the human body is approximately seven per cent of the total body's weight which will be about 5 to 5.5 liters (1.5 gallons) of blood.

Human blood comprises of 4 components that serve specific tasks, namely:

- Plasma.
- Red Blood Cells.
- White Blood Cells.
    1. Eosinophil.
    2. Basophil.
    3. Neutrophil.
    4. Lymphocytes.
        - T-Lymphocyte.
        - B-Lymphocytes.
    1. Monocytes.
    2. Platelets.

Plasma: Plasma is straw colored viscous fluid that constitutes 55% of blood volume. It consists of 90-92% water, 6-8% protein (fibrinogens, albumins and globulins), glucose, amino acids and small amount of minerals like Na^+, Ca^{++}, Cl^- etc.

Formed elements: Erythrocytes, leucocytes and platelets are collectively called formed elements.

Erythrocytes: Erythrocytes are most abundant cells in human body. Total blood count of RBCs is 5-5.5 million, which is slightly less in females due to menstruation. It is formed in bone marrow. Nucleus is absent in mammalian RBCs having biconcave shape.

Every 100 ml of blood contain 12-16 gm. of haemoglobin. They have life span of 120 days. They are destroyed in spleen (graveyard of RBCs)

Leucocytes: Leucocytes or WBCs are colourless due to absence of haemoglobin. 6000-8000 of WBCs are present in each ml. of blood.

Neutrophils: Neutrophils are most abundant and basophils are least abundant WBCs. Monocytes and neutrophils are phagocytic cells which destroy foreign organisms.

- Basophils secrete histamine, serotonin and heparin that are involved in inflammatory reactions.
- Eosinophils resist infection and allergic reactions. B and T lymphocytes are

responsible for immune response of the body.

Thrombocytes: Thrombocytes or platelets are cell fragments produced from megakaryocytes in bone marrow. 150000-350000 platelets are present in each ml of blood. Platelets are involved in clotting or coagulation of blood in case of injuries.

Serum: Blood plasma from which fibrinogen and other clotting factors have been removed. (Plasma– (fibrinogen & other clotting factor) = blood serum.

Lymph: Lymph is a colorless fluid present in the interstitial tissues. It circulates throughout the lymphatic system. It can be defined as blood without the RBCs. The exchange of nutrients, hormones, and gases occurs through this fluid. It consists of lymphocytes that play a major function in the immune responses of the body.

Blood Groups: blood of human beings differ in certain aspects although it appear same in all individuals. Two main types of grouping are ABO and Rh.

ABO grouping is based on presence or absence of two surface antigens RBC, antigen A and antigen B. The plasma of an individual also contains two antibodies produced in response of antigens.

Blood Groups and Donor Compatibility

Blood Group	Antigens on RBCs	Antibodies in Plasma	Donor's Group
A	A	anti-B	A, O
B	B	anti-A	B, O
AB	A, B	nil	AB, A, B, O
O	nil	anti-A, B	O

- During blood transfusion, blood of donor has to be matched with blood of recipients to avoid clumping of RBCs.
- Group 'O' blood can be donated to any individual with any blood group, so it is called universal donor.
- Person with 'AB' blood group can receive blood from any person of any group, so it is called universal recipient.

Rh grouping: Rh antigen (similar to Rhesus monkey) are observed on surface of RBCs of majority of individuals (about 80%). Such people are called Rh positive (Rh+) and those in whom this antigen is absent are called Rh negative (Rh-).

Erythroblastosis foetalis: If father blood is Rh+ and mother blood is Rh-, the foetus blood is Rh+. During the delivery of first child there is a possibility of exposure of mother blood with foetus blood to develop antibodies in mother blood. In subsequent pregnancy the mother's blood can leak into foetus blood and

destroy the foetus RBC. This case is called erythroblastosis foetalis.

Coagulation of blood (Blood Clotting): When an injury is caused to a blood vessel bleeding starts which is stopped by a process called blood clotting. An injury or trauma stimulates the platelets in the blood to release certain factors that activate the mechanism of coagulation. Calcium play important role in blood clotting.

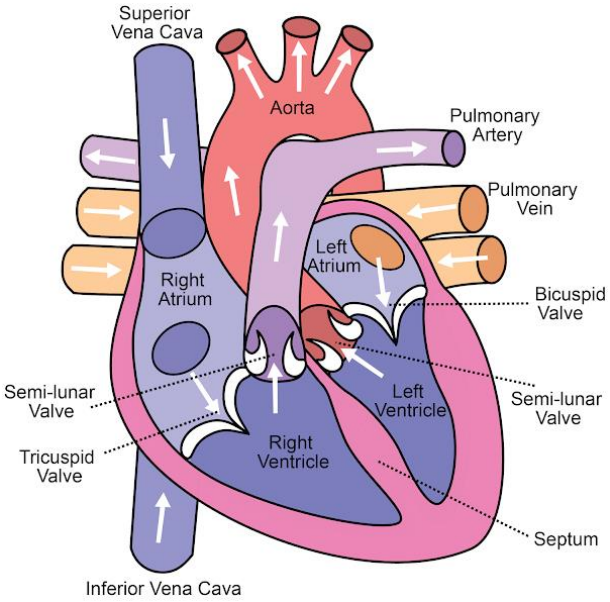
Human Circulatory System

The human circulatory system consists of four main organs, which function together and each of them has specific roles and functions that helps in smooth circulation of blood to different parts of the body.

The vital circulatory system organs include:

- Heart.
- Blood.
- Blood Vessels.
- Lymphatic system.

Heart: Heart is the mesodermally derived muscular organ, present in thoracic cavity between the two lungs protected by double membrane of pericardium.

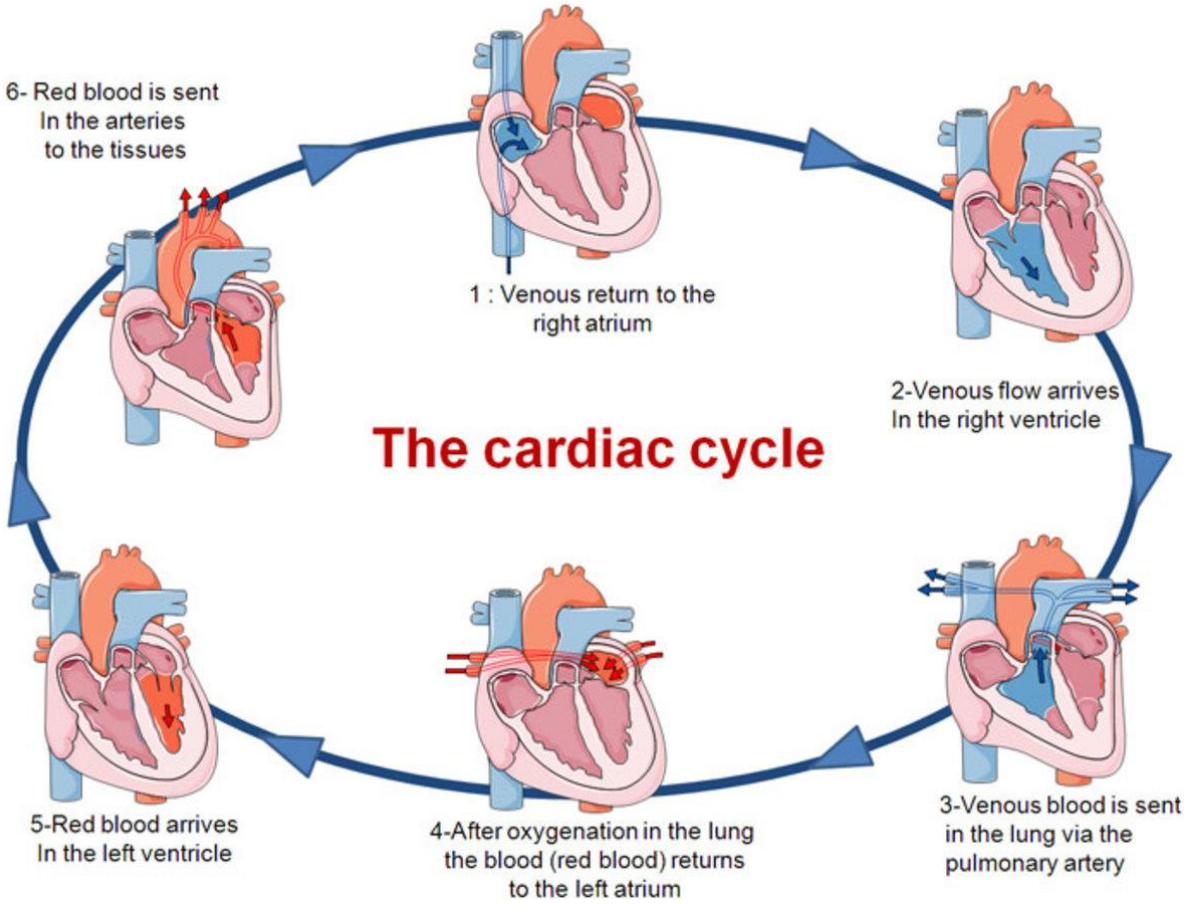


- The upper two chamber is called atria and lower two chambers are called ventricles. Interatrial septum separate the right and left atrium and thick walled inter ventricle septum separate the ventricles.
- The opening between right atrium and right ventricle is guarded by a three muscular flaps called tricuspid valve. Bicuspid or mitral valve guards the left atrium and ventricle.
- The opening of right and left ventricle to pulmonary artery and aorta respectively is controlled by semilunar valve.
- The nodal tissue present on upper right corner of right atrium is called SAN (sino-atrial node) and those on lower left corner of right atrium is called AVN (atrio-ventricular node).

- The purkinje fibers along with right and left bundles form the bundle of HIS. The nodal musculature has ability to generate action potential.
- SAN generate maximum number of action potential and is responsible for rhythmic contraction of heart. Therefore, it is called pace maker.

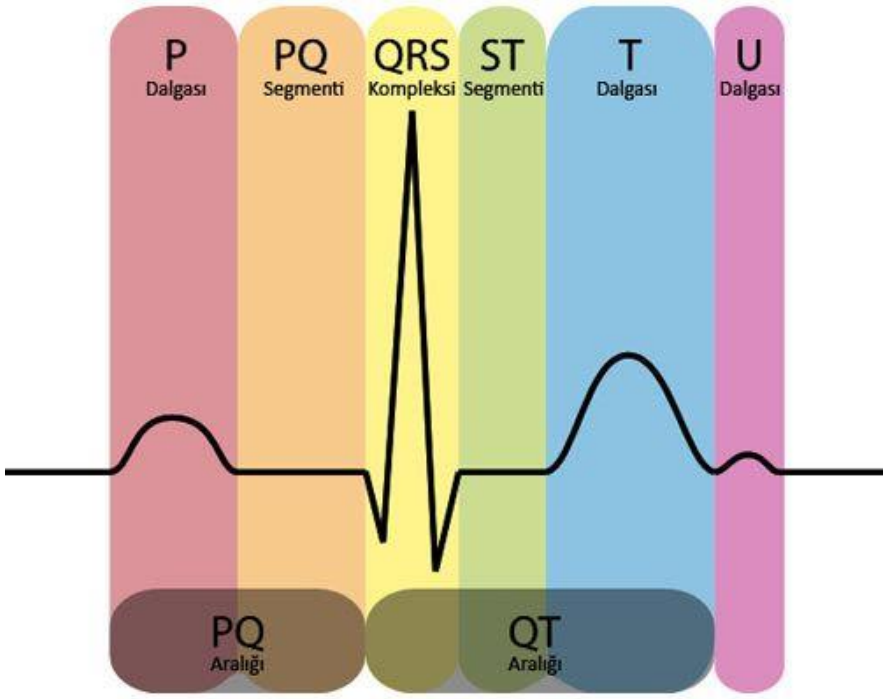
Cardiac Cycle

- To begin with, all four chambers are in relaxed state called joint diastole. As the bicuspid and tricuspid valves are open, blood from pulmonary vein and vena cava flows to left and right ventricle respectively. Semilunar valves are closed at this stage.
- SA node generates action potential that contracts both atria (atrial systole). The action potential passes to AV node and bundle of HIS transmit it to ventricular musculature to cause ventricular systole. At the same time atria undergoes relaxation diastole to close the bicuspid and tricuspid valve.
- Semilunar valves open into circulatory system that relax the ventricle and close the valves to prevent back flow of blood.
- As the pressure inside ventricle decreases the bicuspid and tricuspid valve open to repeat the process or cardiac cycle.
- During each cardiac cycle two sounds are produced. The first sound (lub) is due to closure of bicuspid and tricuspid valve and 2nd heart sound (dub) is due to closure of semilunar valve.



ECG (Electrocardiograph)

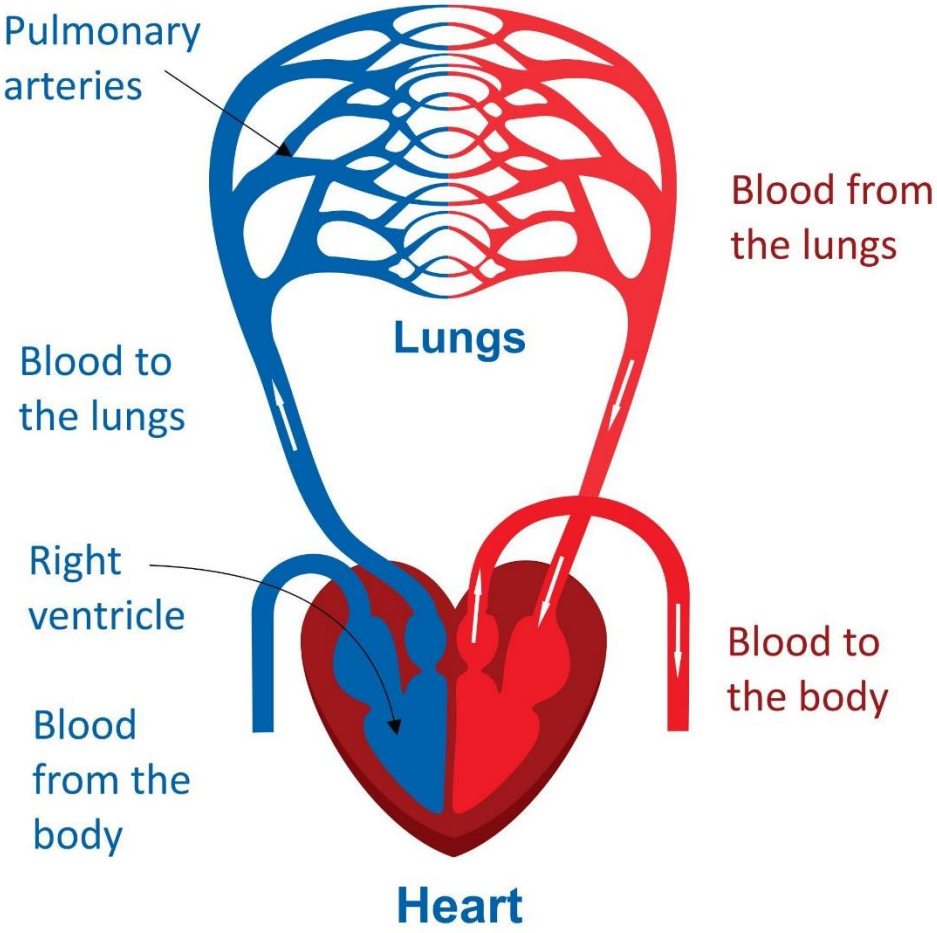
ECG (Electrocardiograph) is a graphical representation of electrical activity of heart during cardiac cycle. The electrocardiograph machine is used to obtain electrocardiogram. The patient is connected to three electrical leads to wrists and left ankle.



- The P-wave represents the electrical excitation of atria (depolarization) which leads to contraction of atria.
- The QRS-wave represents the depolarization of ventricles, which initiates the ventricular contraction.
- The T-wave represents the return of ventricle from exited to normal state (repolarization). The end of T-wave marks the end of systole. Counting the number of QRS complex in given period of time determine the heartbeat rate.

Double Circulation: Flow of same blood twice through the heart once in oxygenated form and other in deoxygenated form is called double circulation. It includes systematic and pulmonary circulation.

Systematic circulation: Systematic circulation includes flow of oxygenated blood from the left ventricle to all parts of body and deoxygenated blood from various body parts to the right atrium. All systematic circulation starts form aorta and ends at superior vena cava, inferior vena cava or coronary sinus to right atrium. The systematic circulation provides oxygen, nutrients and other substances to the tissues and take CO2 and other harmful substances away for removal.



Pulmonary Circulation:

- The flow of deoxygenated blood from the right ventricle to the lungs and the return of oxygenated blood from the lung to the left atrium is called pulmonary circulation.
- Two pulmonary veins from each lung transport the oxygenated blood to the left atrium.
- Double circulation prevents the mixing of oxygenated and deoxygenated blood.

Regulation of Cardiac Activity:

- Normal activities of heart are regulated by nodal tissue (SA and AV node), so the heart is myogenic.
- A special neural center in medulla oblongata moderates the cardiac function by ANS. Sympathetic nerve can increase the rate of heart beat and parasympathetic nerve of ANS decrease the rate of heart beat.
- Adrenal medullary hormone also increases the cardiac output.

Disorder of Circulatory System:

Hypertension (high blood pressure): Blood pressure higher than (120/80) . 120 mm Hg is the systolic that is pumping pressure and 80 mm Hg is the diastole, resting pressure. It leads to heart disease and affect vital organs like brain and kidney.

Coronary Artery Disease (CAD): Commonly called atherosclerosis that affects the blood vessels that supply blood to heart muscles due to deposition of fat, calcium, cholesterol that makes the arteries lumen narrower.

Angina: Also called angina pectoris, acute chest pain due to less supply of oxygen to heart muscles. It may occur in elderly male and female. It occurs due to restricted blood flow.

Heart failure: Heart does not pump enough blood to meet the requirement of body. It is also known as congestive heart failure because congestion of lung is one of its causes. Heart failure is different from heart attack (heart muscle is damaged by inadequate blood supply) and cardiac arrest (when heart stops beating).

Coronary Thrombosis: Formation of clot in the coronary artery is coronary thrombosis. It occurs most frequently in the left anterior descending coronary artery.

NCERT LINE BY LINE QUESTIONS

1. Which of the following use water from their environment as circulating fluid – **[Pg-278,E]**
(A) Sponges (B) Coelenterates (C) a and b (D) Fishes

Para- 18.1, 18.1.1, 18.1.2

Blood-Plasma and Formed Elements

2. Blood, a special type of connective tissue **Pg-278,E]**
(A) Consists of a fluid matrix (Plasma)
(B) Has formed elements
(C) Is the most commonly used body fluid by most of the higher organisms
(D) All

3. Plasma is a straw coloured, viscous fluid constituting nearly ____ % of blood – **[Pg-278,E]**
(A) 55 (B) 45 (C) 90 (D) 10

4. The amount of water present in blood plasma is – **[Pg-278,E]**
(A) 99% (B) 90-92% (C) 10% (D) 55%

5. I. Proteins contribute 6 - 8% of the blood plasma
II. Plasma contains very high amount of minerals
Ill. Plasma without the clotting factors is called serum
IV Glucose, amino acids, lipids, etc., are also present in the plasma as they are always in transit in the body. Of the above statements – **[Pg-278,279,E]**
(A) All are correct (B) Only II is false
(C) Only I, III, IV is correct (D) All are false

6. Match List I with List II and select the correct option **[Pg-279,M]**

	7**List I** (Plasma protein)		**List II** (Functions)
I.	Fibrinogen	A.	Defense mechanism
II.	Globulins	B.	Osmotic balance
Ill.	Albumins	C.	Coagulation of blood

(A) I-C, II-A, III-B (B) I-A, II-C, III-B (C) I-C, II-B, III-A (D) l-B, II-A, III-C

7. Formed elements of blood include – **[Pg-279,E]**
(A) RBC, WBC and blood platelets (B) All solutes present in blood
(C) Proteins present in blood (D) All minerals (elements)

8. Which of the following statements is false? **[Pg-279,E]**
(A) Erythrocytes/RBC are the least abundant of all the cells in blood.
(B) The number of RBCs in adult man per mm3 of blood is 5 million to 5.5. million.
(C) RSC are formed in the red bone marrow in the adults.
(D) RBCs are enucleate in most of the mammals.

9. Life span of human RBC is – **[Pg-279,E]**
(A) 120 hours (B) 120 month (C) 120 days (D) 102 days

10. What is the amount of haemoglobin present in 100 ml blood of human blood? [Pg-279,E]
(A) 45g (B) 18-20g (C) 12-16g (D) 10 -12g

11. Mammalian RBCs are in shape- **[Pg-279,E]**
(A) Oval (B) Biconvex (C) biconcave (D) Sickle like

12. All of the following statement are correct about WBCs except – **[Pg-279,M]**
(A) They are nucleate and least constancy in shape
(B) They are lesser in number (6000 – 8000 per mm3 blood)
(C) They are generally short lived
(D) They help in blood clotting

13. All of the following are granulocytes except- **[Pg-279,E]**

(A) Neutrophils (B) Eosinophils
(C) Basophils only (D) Lymphocytes and monocytes

14. Match list I with list II correctly – **[Pg-279,M]**

	List I (Types of leucocytes/ WBCs)		**List II** (Their% (of total WBC)
I.	Neutrophils	A.	20 - 25
II.	Basophils	B.	2 - 3
Ill.	Monocytes	C.	6 - 8
IV.	Eosinophils	D.	0.5 - 1
V.	Lymphocytes	E.	60 - 65

(A) I - E, II - D, III - C, IV -A, V - B (B) I -A, II - B, III - C, IV - E, V - D
(C) I - E, II - D, III - C. IV - B, V –A (D) I - B, II - D, III -A, IV - C, V –A

15. Match the following – **[Pg-279,M]**

	Column I		**Column II**
I.	Basophils	A.	Phagocytes
II.	Neutrophils	B.	Secrete histamine, serotonin , heparin and involved in inflammatory response
III.	Monocytes	C.	Resist infections and are also involved in allergic reaction
IV.	Eosinophils	D.	Immunity
V.	Lympho cytes		

(A) I - B, II and III -A, IV - C, V - D (B) I - B, II and III - C, IV -A, V - D
(C) I - C, II and III -A, IV - B, V - D (D) I - D, II and III -C, IV -A, V – B

16. Megakaryocytes produce- **[Pg-280,E]**
(A) Leucocytes (B) Lymphocytes
(C) Bone cells (D) Blood platelets (thrombocytes)

17. Which of the following is cell fragments? **[Pg-280,E]**
(A) Leucocytes (B) RBCs (C) Blood platelets (D) None

18. 1 mm^3 blood has how many blood platelets? **[Pg-280,E]**
(A) 150000 – 350000 (B) 1.5 million to 3.5 million
(C) 1500-3000 (D) 10 to 15 lacs

19. During blood clotting, platelets release – **[Pg-280,E]**
(A) Thrombin
(B) Fibrinogen
(C) Prothrombin
(D) Thrombokinase and other blood clotting factor

20. Find the correct descending order of proportion of leucocytes in human blood. **[Pg-279,E]**
(A) Neutrophils → Basophils →Lymphocytes → Acidophils (Eosinophils) Monocytes
(B) Neutrophils → Monocytes→Lymphocytes→ Acidophils → Basophils
(C) Neutrophils →Lymphocytes→ Monocytes → Acidophils → Basophils
(D) Neutrophils → Acidophils → Basophils → Lymphocytes → Monocytes

21. Assertion – A physician might order a white cell count for a patient with symptoms of an infection.
Reason- An increase in the number of white blood cells (leukocytes) may indicate that the person is combating an infection. **[Pg-279,E]**
A) Both assertion and reason are true and reason is correct explanation of assertion.
B) Both assertion and reason are true and reason is not correct explanation of assertion
C) Assertion is true but reason is false.
D) Both assertion and reason are false.

Para-18.1.3 Blood Groups

22. ABO blood grouping is based on the presence or absence of surface antigens **[Pg-280,E]**
(A) 2 (B) 3 (C) 6 (D) 12

23. Fill up gaps given below in the table- **[Pg-280,M]**

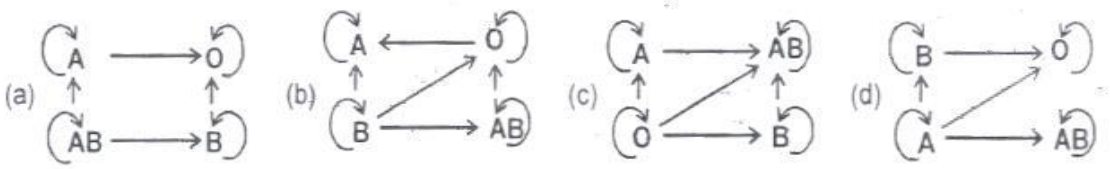
Blood group	**Antigens on RBCs**	**Antibody in Plasma**	**Donor groups**
A	A	Anti- B	A,O
B	B	Anti-A	B,O
AB	AB	___II____	A,B,ABO
O	__I_	____III____	___IV___

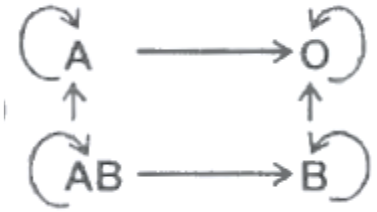
	I	**II**	**III**	**IV**
(a)	Nil	Nil	Nil	O
(b)	Nil	Nil	Anti-A,B	AB
(c)	Nil	Anti-A,B	Nil	O
(d)	Nil	Nil	Anti-A,B	O

24. Which of the following blood groups is universal donor and universal acceptors respectively? **[Pg-280,E]**

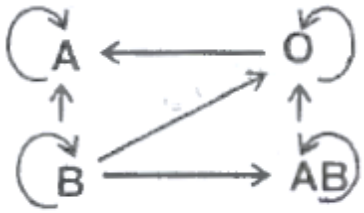
(A) AB, O (B) O, AB (C) AB, A (D) A, AB

25. Which of the following representations is correct about blood groups and donor compatibility? **[Pg-280,M]**



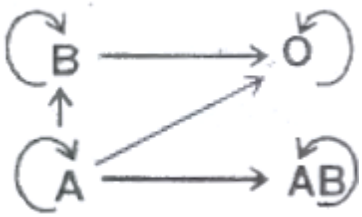


(A)



(B)

(C)



D)

26. Rh factor is concerned with blood grouping. It derives its name from- **[Pg-281,E]**
(A) Man (B) Chimpanzee (C) Monkey D) Rat

27. Rh factor is responsible for- **[Pg-281,E]**
(A) Sickle cell anemia (B) Erythroblastosis foetalis
(C) AIDS (D) Turner syndrome

28. In developing foetus, erythroblastosis foetalis is caused by-

(A) Haemolysis (B) Clumping of RBCs
(C) Failure of blood clotting (D) Phagocytosis by WBC

29. In erythroblastosis foetalis, which of the following factors passes through placenta into foetus - **[Pg-281,E]**
(A) Rh antigens (B) Rh antibodies (C) Agglutinins (D) ABO antibodies

30. A doctor suggested to a couple not to have more than one child because of – **[Pg-281,M]**
(A) Rh+ male and Rh- female (B) Rh- male and Rh+ female
(C) Rh- male and Rh- female (D) Rh+ male and Rh+ female

31. In case of emergency which blood group could be safely transfused? **[Pg-281,M]**
(A) AB Rh- (B) AB Rh+ (C) O Rh- (D) O Rh+

32. Which of the following is expected if husband is Rh+ and wife is Rh-? **[Pg-281,M]**
(A) No problem with 1st pregnancy
(B) Problem would be expected with future pregnancies
(C) Both
(D) No problem could be expected in any pregnancy

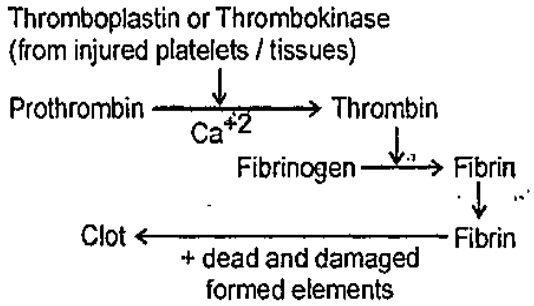
33. Which of the following statements is correct? **[Pg-281,H]**
(A) Rh compatibility must be tested before pregnancy establishment and blood transfusion
(B) Rh antibodies can cross placenta
(C) At the time of 1st delivery some of Rh+ RB Cs from the baby (Rh+) mix the mother's blood (Rh-) due to tear in placenta mother's blood for Rh- antibodies
(D) All

Para-18.1.4
Coagulation of Blood

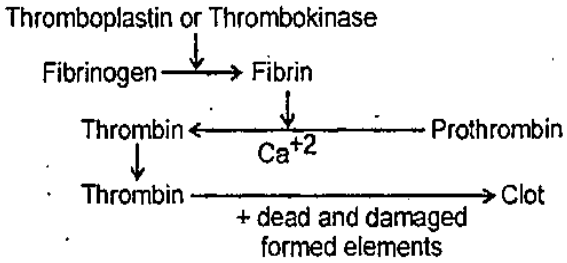
34. What is the correct order of these events? **[Pg-281,M]**
1. Conversion of fibrinogen to fibrin
2. Clot retraction and leakage of serum
3. Thromboplastin formation
4. Conversion of prothrombin to thrombin
(A) 3,2,1, 4 (B) 3,4,1,2 (C) 3,4,2,1 D) 4,1,3,2

35. Which of the following statement are correct? **[Pg-281,M]**
I. Ca^{+2} is necessary for blood coagulation
II. Coagulation in blood vessel is prevented during normal condition by heparin
III. Clotting of blood involves changes of fibrinogen to fibrin by thrombin
IV. Blood clotting involves cascading process involving a number of factors present in the active form always
(A) I, Ill, IV (B) II, IV (C) I, II, Ill (D) Ill, IV

36. Which of the following pathways is correct for blood clotting **[Pg-281,H]**
A)

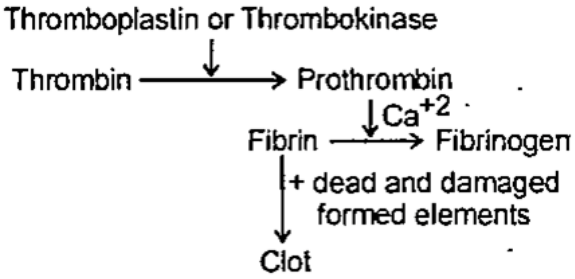


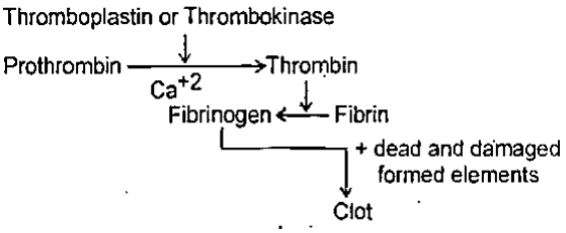
B)



C)

D)





Para- 18.2 Lymph (Tissue fluid)

37. Which of following statements is wrong about lymph. **[Pg-282,M]**
I. Lymph is colourful as it has haemoglobin but no RBC
II. The fluid present in lymphatic system is called lymph
III. It contains specialized lymphocytes which are responsible for immunity of the body
IV. Lymph is an important carrier for nutrients and hormones
V. Fats are absorbed through lymph in the lacteals present in the intestinal villi **[Pg-282,M]**
(A) Only I (B) III and IV (C) II and III (D) Only IV

38. Which of the following statements is correct? **[Pg-282,M]**
I. Lymphatic system collects tissue fluid/interstitial fluid and drains it back to the major veins
II. Interstitial fluid (tissue fluid) and lymph have almost similar composition
III. Lymph and interstitial fluid have no larger proteins and RBC
IV. Exchange of nutrients and gases, etc. between the blood and cells always occurs through tissue flu id
V. Interstitial fluid has the same mineral distribution as that in plasma
VI. Lymph can be defined as blood minus RBC but has specialized lymphocytes
(A) All (B) Only III and IV (C) V and VI (D) I, III, V

Para-18.3 Circulatory Pathways

39. Open circulatory system is found in – **[Pg-282,E]**
(A) Arthropods and molluscs (B) Annelids and Chordates
(C) Annelids and arthropods (D) Fishes and molluscs

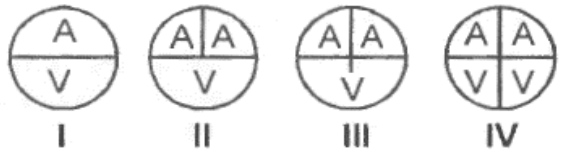
40. Closed circulatory system is found in – **[Pg-282,E]**
(A) Arthropod and chordates (B) Molluscs and chordates
(C) Amphibians and molluscs D) Annelids and chordates

41. In an open circulatory system – **[Pg-282,E]**
(A) There is no heart
(B) There is no need of blood vessels
(C) There is no distinction between blood and tissue fluid
(D) There are no open spaces or sinuses in the body

42. Advantages of closed circulatory system over open circulatory system includes which of the following? **[Pg-282,E]**
(A) Closed system can direct blood to specific tissues
(B) Exchange occurs more rapidly
(C) Close circulatory system can support higher levels of metabolic activity
(D) All

43. Which of the following statements is wrong about the closed circulatory system? **[Pg-282,M]**
(A) Blood remains within blood vessels and never comes in direct contact with the body cells
(B) In it flow of fluid can be more precisely regulated
(C) There is no blood capillary
(D) Blood flow is more rapid due to higher pressure

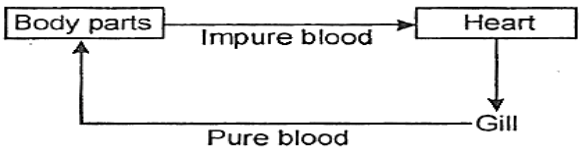
44. Following are figures of hearts in different animals **[Pg-282,M]**



A= Auricle
V = Ventricle
Identify with their characteristic hearts –

	I	II	III	IV
a)	Fishes	Reptiles	All reptiles	Birds, Mammals
(b)	Fishes	Birds	Reptiles, birds	Mammal
(c)	Fishes	Amphibians	Reptiles	Crocodiles, Birds, Mammals
(d)	Fishes	Crocodiles	Amphibi ans, Reptiles	Birds, Mammals

45. In fishes the blood circulation is represented as - **[Pg-282,E]**



The above flow of blood indicates it is a
(A) Double circulation
(B) Single circulation
(C) Incomplete single circulation
(D) Incomplete double circulation

46. Incomplete double circulation is found in which of the following animals?**[Pg-282,E]**
(A) Birds
(B) Mammals
(C) Birds and Mammals
(D)Amphibians and Reptiles

Para-18.3.1 Human Circulatory System

47. Which of the following statements is not true? **[Pg-283,E]**
(A) Heart is ectodermal in origin
(B) In human beings heart is situated in the thoracic cavity, in between the two lungs slightly lifted to the left
(C) Human heart has the size of a clenched fist.
(D) Double wall membranous bag (pericardium) with pericardia! fluid protects heart

48. Which of the following is correct about human heart? **[Pg-283,E]**
(A) The volume of both atria> the volume of both ventricles
(B) The volume of both ventricle > the volume of both atria
(C) The volume of both atria= the volume of both ventricles
(D) Ventricles are upper chambers and atria are lower chambers in our heart

49. Bicuspid valve/mitral valve is found between - **[Pg-283,E]**
(A) Left atrium and left ventricle
(B) Right atrium and right ventricle
(C) Right atrium and left ventricle
(D) Left atrium and right ventricle

50. Tricuspid valve is present between the- **[Pg-283,E]**
(A) Two atria (B) Two ventricles
(C) Left atrium and left ventricle (D) Right atrium and right ventricle

51. Chordae tendinae are found in – **[Pg-283,E]**
(A) Joints (B) Atria of heart
(C) Ventricles of heart (D) Ventricles of brain

52. Ventricles are thick-walled as compared to atrium because - **[Pg-283,E]**
(A) It is to receive blood from atria (B) It is present on the posterior side
(C) It is to pump blood (D) None

53. Which of the following has thickest wall? **[Pg-283,E]**
(A) Left auricle (B) Left ventricle (C) Right auricle (D) Right ventricle

54. Match the following. **[Pg-283,284,E]**

	Column I		**Column II**
A.	Superior vena cava	p.	carries deoxygenated blood to lungs
B.	Inferior vena cava	q.	carries oxygenated blood from lungs
C.	Pulmonary artery	r.	brings deoxygenated blood from lower part of body to right atrium
D.	Pulmonary vein	s.	bring deoxygenated blood from upper part of body to right atrium

(A) A - q, B - s, C - r, D - p (B) A - s, B - p, C - q, D - r
(C) A- s, B - r, C - p, D - q (D) A - s, B - p, C - r, D – q

55. Origin of heart beat and its conduction is represented by - **[Pg-284,E]**
A) SA-node → Purkinje fibres → AV-node→ Bundle of His
B) AV-node→ Bundle of His→ SA- node→ Purkinje fibres
C) Purkinje fibres→ AV-node→ SA- node→ Bundle of His
D) SA-node→ AV- node→ Bundle of His→ Purkinje fibres

56. 'Heart of heart' is – **[Pg-284,E]**
(A) SA – node (B) AV – node (C) Bundle of his (D) Purkinje fibres

57. SA node is located in – **[Pg-284,E]**
(A) Upper lateral wall of left atrium (B) Lower lateral wall of left atrium
(C) Lower lateral wall of right atrium (D) Upper lateral wall of right atrium

58. SA node is called pace maker of the heart. Why? **[Pg-284,E]**
(A) It can change contractile activity generated by AV node
(B) It delays the transmission of impulse between the atria and ventricles
(C) It gets stimulated when it receives neural signal
(D) It initiates and maintains the rhythmic contractile activity of heart

59. Sino-atrial node (SAN) can generate impulses **[Pg-284,E]**
(A) 70 - 75 min^{-1} (B) 50 - 55 min^{-1} (C) 35 - 40 min^{-1} (D) 100-150 min^{-1}

60. The impulse of heart beat originate from – **[Pg-284,E]**
(A) SAN (B) AVN (C) Vagus nerve (D) Cardiac nerve

61. Rate of heart is determined by- **[Pg-284,E]**
(A) SAN (B) AVN (C) Purkinje fibres (D) Bundle of His

62. Bundle of His is a group of- **[Pg-284,E]**
(A) Ganglia (B) Nerve fibres (C) Muscular fibres (D) Connective tissue

63. Bundle of His / AV-bundle found in – **[Pg-284,E]**
(A) Right auricle (B) Left auricle
(C) Bone (D) lnterventricular septum

64. Atria-ventricular node (AVN) is situated in **[Pg-284,E]**
(A) Lower left corner of left auricle, close to AV-septum
(B) Lower left corner of right auricle, close to AV-septum
(C) Upper left corner of right auricle, close to AV-septum

(D)Upper left corner of left auricle, close to AV-septum

65. Purkinje fibres are present in -**[Pg-284,E]**
(A) Left auricle (B) Right auricle
(C) Ventricular myocardium (D) SAN

66. The chordae tendinae- **[Pg-284,E]**
(A) Close the AV-valves
(B) Prevent the AV-valves flaps from everting
(C) Open semilunar valves
(D)Are present in auricles

67. Which of the following correctly traces the electrical impulses that trigger each heart beat **[Pg-284,E]**
A) Pacemaker → AV node→ Atria → Ventricles
B) Pacemaker → Atria → AV node → Ventricles
C) AV node → Pacemaker → Auricles →Ventricles
D) Ventricle→ pacemaker→ AV node→ Auricle

68. An atrioventricular valve prevents the back flow or leakage of blood from – **[Pg-284,M]**
(A) The right ventricle into the right atrium
(B) The left atrium into the left ventricle
(C) The aorta into the left ventricle
(D) The pulmonary vein into the right atrium

69. How many double circulations are normally completed by the human heart in one minute? **[Pg-283,E]**
(A) 8 (B) 16 (C) 36 (D) 72

70. Assertion- If you trace the path of a molecule of carbon dioxide that starts in an arteriole in the right thumb and leaves the body in exhaled air, the minimum number of capillary beds the molecule encountered is 2.
Reason- The molecule of carbon dioxide would need to enter a capillary bed in the thumb before returning to the right atrium and ventricle, then travel to the lung and enter a capillary from which it would diffuse into an alveolus and be available to be exhaled. **[Pg-282,H]**
A) Both assertion and reason are true and reason is correct explanation of assertion.
B) Both assertion and reason are true and reason is not correct explanation of assertion.
C) Assertion is true but reason is false.
D) Both assertion and reason are false

Para-18.3.2 Cardiac Cycle

71. The duration of cardiac cycle in a normal man is - **[Pg-284,E]**
(A) 0.8 seconds (B) 80 seconds (C) 60 seconds (D) 72 seconds

72. During systole of heart - **[Pg-284,E]**
A) Only atria contract
B) only ventricles contract
C) Auricles and ventricles contract separately
D) Auricles and ventricles contract simultaneously

73. During ventricular systole – **[Pg-284,M]**
(A) Oxygenated blood is pumped into the aorta and deoxygenated blood is pumped into the pulmonary artery
(B) Oxygenated blood is pumped into the pulmonary artery and deoxygenated blood is pumped into the artery
(C) Oxygenated blood is pumped into aorta and deoxygenated blood is pumped into pulmonary vein
(D) Oxygenated blood is pumped into pulmonary vein and deoxygenated blood is pumped into pulmonary artery

74. Contraction of right ventricle pumps blood into- **[Pg-285,E]**
(A) Dorsal aorta (B) Pulmonary vein
(C) Coronary artery (D) Pulmonary artery

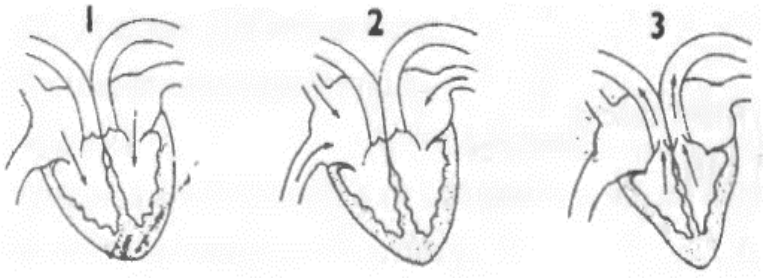
75. When ventricular systole occurs – **[Pg-284,E]**
(A) Auricular diastole coincides
(B) Tricuspid and bicuspid valves close
(C) Semilunar valves guarding pulmonary artery and aorta are forced to open

(D) All

76. During cardiac cycle about % of ventricular filling occurs prior to atrial contraction. _____% ventricular filling occurs due to atrial contraction – **[Pg-285,E]**
(A) 50, 50 (B) 70, 30 (C) 30, 70 (D) 10, 90

77. Which of the following events do not occur during joint diastole? **[Pg-285,M]**
I. All 4 chambers of heart are in relaxed state
II. Tricuspid and bicuspid valves open
III. Action potential is conducted from SAN to AVN
IV. Blood from the pulmonary veins and vena cava flows into the left and right ventricles respectively through the left and right atria
V. The Semilunar valves are closed
(A) Only V (B) Only III (C) Only IV (D) Only I and II

78. The accompanying diagram shows three stages in the cardiac cycle-**[Pg-284,285,H]**



Which of the following sequence is correct?
(A) 2,3, 1 (B)1,2, 3 (C) 2, 1, 3 (D) 3,1, 2

79. Cardiac output is determined by – **[Pg-285,E]**
(A) Heart rate (B) Stroke volume (C) Blood flow (D) Both a and b

80. The amount of blood to be pumped out by each ventricle/minute is- **[Pg-285,E]**
(A) Stroke volume (B) Cardiac output (C) Tidal volume (D) Residual volume

81. During cardiac cycle each ventricle pumps out about 70 ml of blood which is called - **[Pg-285,E]**
(A) Stroke volume (B) Cardiac output (C) Tidal volume (D) Residual volume

82. A red blood cell, entering the right side of the heart passes by or through the following structures – **[Pg-285,M]**
1. Atrioventricular valves
2. Semi-lunar valves
3. Right atrium
4. Right ventricle
5. SAN
A) 2→3→1→4→5 B) 3→1→5→2→4 C) 3→5→1→2→4 D) 5→3→1→4→2

83. Cardiac output is – **[Pg-285,H]**
(A) Stroke volume (SV) x Heart rate (HR)= 5L/ min
(B) SV x HR= 500 ml
(C) SV x HR= 72 ml/min
(D) SV x HR= 70 ml/min

84. Which of the following statement is not true? **[Pg-285,H]**
(A) Cardiac output of an athlete is much higher than that of an ordinary man
(B) In each minute a single cardiac cycle is performed
(C) Cardiac sounds are of clinical diagnostic significances
(D) Cardiac cycle includes Auricular systole, ventricular systole and joint diastole/complete diastole

85. First cardiac sound (lub) is associated with- **[Pg-285,M]**
(A) Closure of tricuspid and bicuspid valves
(B) Opening of tricuspid and bicuspid valves
(C) Closure of semilunar valves
(D) Opening of semi lunar valves

86. Which of the following statement is wrong for second cardiac sound? **[Pg-285,M]**
(A) It is heard as dup
(B) It is produced due to closure of semilunar valves

(C) It is clinically significant
(D) It is clinically non-significant

87. **Assertion -** The AV node delay the electrical impulse moving from the SA node and the atria to the ventricles.
Reason- The delay allows the atria to empty completely, filling ventricles fully before they contract. **[Pg-285,H]**
A) Both assertion and reason are true and reason is correct explanation of assertion.
B) Both assertion and reason are true and reason is not correct explanation of assertion.
C) Assertion is true but reason is false.
D) Both assertion and reason are false.

88. **Assertion -** After exercising regularly for several months, our resting heart rate decreases, but our cardiac output at rest is unchanged.
Reason- The heart, like any other muscle, becomes stronger through regular exercise. The stronger heart would have a lesser stroke volume, which would allow for the decrease in heart rate. **[Pg-285,H]**
A) Both assertion and reason are true and reason is correct explanation of assertion.
B) Both assertion and reason are true and reason is not correct explanation of assertion.
C) Assertion is true but reason is false.
D) Both assertion and reason are false

Para – 18.3.3 Electrocardiograph (ECG)

89. Electrocardiogram is a measure of- **[Pg-285,E]**
(A) Heart rate (B) Ventricular contraction
(C) Volume of blood pumped (D) Electrical activity of heart

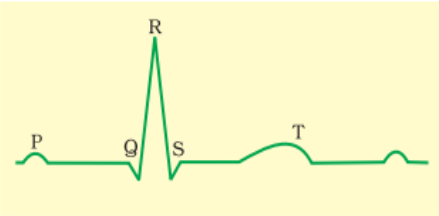
90. Which of the following is a false statement? **[Pg-285,M]**
(A) ECG is of a great clinical significance
(B) Electrocardiograph is the recording of electrical changes during the cardiac cycle
(C) To obtain a standard ECG, a patient is connected to the machine with 3 electrical electrodes (one to each wrist and to the left ankle)
(D) Normal activities of the heart are regulated intrinsically

91. P-wave represents - **[Pg-286,E]**
(A) Depolarization of ventricles (B) Repolarization of ventricle
(C) Repolarization of atria (D) Depolarization of atria

92. QRS complex represents the - **[Pg-286,E]**
(A) Depolarization of ventricles (B) Repolarization of ventricles
(C) Repolarization of atria (D) Depolarization of atria

93. T wave on an ECG represents – **[Pg-286,E]**
(A) Depolarization of ventricles (B) Repolarization of ventricle
(C) Repolarization of atria (D) Depolarization of atria

94. The below figure is the diagrammatic representation of standard ECG. **[Pg-286,M]**



	Column I		**Column II**
A.	P- wave	I.	Ventricular depolarization followed by ventricular contraction
B.	QRS Complex	II.	Atrial depolarization followed by systole of both atria

C.	T- wave	III.	Ventricular repolarization followed by ventricular relaxation

(A) A-I, B-II, C-III (B)A-III, B -II, C-I (C) A-II, B – I. C - III (D) A-II, B-III, C – I

95. Match the Column I with Column II – **[Pg-286,M]**

	Column I		**Column II**
A.	Counting the number of QRS complex in a given time period	I.	A detailed evaluation of the heart function
B.	Potential generated by the recovery of ventricles from the depolarization state	II.	Determination of heart beat
C.	Multiple leads are attached to the chest region	III.	T-wave

	A	**B**	**C**	**D**	**E**
A	II	III	I	III	II
B	V	IV	I	III	II
C	IV	V	III	II	III
D	V	IV	I	III	I

Para-18.4
Double Circulation

96. Which of the following options represents the pulmonary circulation in human being – **[Pg-286,E]**

(a) Left Auricle $\xrightarrow[\text{blood}]{\text{Oxygenated}}$ Lungs $\xrightarrow[\text{blood}]{\text{Deoxygenated}}$ Right ventricle

(b) Left Auricle $\xrightarrow[\text{blood}]{\text{Deoxygenated}}$ Lungs $\xrightarrow[\text{blood}]{\text{Oxygenated}}$ Right Ventricle

(c) Right Ventricle $\xrightarrow[\text{blood}]{\text{Deoxygenated}}$ Lungs $\xrightarrow[\text{blood}]{\text{Oxygenated}}$ Left Auricle

(d) Right Ventricle $\xrightarrow[\text{blood}]{\text{Oxygenated}}$ Lungs $\xrightarrow[\text{blood}]{\text{Deoxygenated}}$ Left Auricle

97. Which of the following options represent correct systemic circulation in human being-

[Pg-286,E]

(a) Left Ventricle $\xrightarrow[\text{blood}]{\text{Deoxygenated}}$ Tissues $\xrightarrow[\text{blood}]{\text{Oxygenated}}$ Right Ventricle

(b) Right Ventricle $\xrightarrow[\text{blood}]{\text{Oxygenated}}$ Tissues $\xrightarrow[\text{blood}]{\text{Deoxygenated}}$ Right Auricle

(c) Left Ventricle $\xrightarrow[\text{blood}]{\text{Deoxygenated}}$ Tissues $\xrightarrow[\text{blood}]{\text{Oxygenated}}$ Right Auricle

(d) Left Ventricle $\xrightarrow[\text{blood}]{\text{Oxygenated}}$ Tissues $\xrightarrow[\text{blood}]{\text{Deoxygenated}}$ Right Auricle

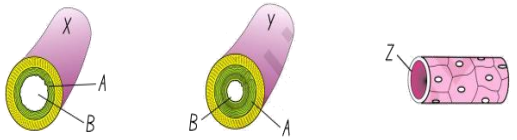
98. Note the following blood vessels – **[Pg-286,E]**

A. Arteriole B. Capillary
C. Aorta D. Muscular artery
E. Vein F. Venule

Choose the correct path that lists the blood vessels in. order, blood passes through them as it leaves the heart, travels to tissue and returns to heart -

(A) C, D, B, A, E, F (B) C, D, A, B, F, E (C) D, C, A, B, E, F (D) D, C, B, A, E, F

99. Identify X, Y and Z? **[Pg-287,E]**



	X	**Y**	**Z**
(a)	Vein	Artery	Capillary
(b)	Capillary	Artery	Vein
(c)	Artery	Capillary	Vein
(d)	Vein	Capillary	Artery

100. Systemic circulation - **[Pg-286,M]**

(A) Provides nutrient, O_2 and other essential substances to the tissues

(B) Takes CO_2 and other harmful substances away for elimination

(C) Both a and b

(D) Carries blood from heart to lungs

101. The blood circulation which starts and ends into capillaries is - **[Pg-286,E]**

(A) Portal circulation (B) Renal circulation
(C) Hepatic circulation (D) Lymphatic circulation

102. Vascular connection between the digestive tracts and liver is called – **[Pg-286,E]**

(A) Hepatic circulation (B) Hepatic-portal system
(C) Both a and b (D) Hepatic sinusoid

103. The hepatic-portal vein carries blood from to the ____ before it is delivered to the systemic circulation- **[Pg-286,E]**

(A) Liver, intestine (B) Pancreas, intestine
(C) Intestine, liver (D) Hepatic artery, hepatic vein

104. A special coronary system of blood vessels present in our body exclusively for the circulation of blood to and from the- **[Pg-287,E]**

(A) Corneocytes (B) Cornea
(C) Cori cycle (D) Heart/Cardiac musculature

105. **Assertion-** The heart of a normally developing human fetus has a hole between the left and right atria. In some cases, this hole does not close completely before birth. If the hole weren't surgically corrected, the O_2 content would be abnormally low.

Reason- In this case, some oxygen depleted blood returned to the right atrium from the systemic circuit would mix with the oxygen rich blood in the left atrium. **[Pg-286,H]**

A) Both assertion and reason are true and reason is correct explanation of assertion.
B) Both assertion and reason are true and reason is not correct explanation of assertion.
C) Assertion is true but reason is false.
D) Both assertion and reason are false

106. **Assertion –** There is low velocity of blood flow in the capillaries.
Reason – There is large total cross sectional area of the capillaries. **[Pg-286,H]**
A) Both assertion and reason are true and reason is correct explanation of assertion.
B) Both assertion and reason are true and reason is not correct explanation of assertion.
C) Assertion is true but reason is false.
D) Both assertion and reason are false

Para- 18.5 Regulation of Cardiac Activity

107. Cardiac centre lies in - **[Pg-287,E]**
(A) Medulla oblongata (B) Pons
(C) Cerebrum (D) Epithalamus

108. Cardiac centre can moderate. the cardiac functions through - **[Pg-287,E]**
(A) Somatic neural system (B) Parasympathetic nervous system only
(C)Autonomic nervous system (ANS) (D) Sympathetic nervous system only

109. Neural signal through the sympathetic nerve (part of ANS) increases cardiac output because of- **[Pg-287,M]**
(A) Increasing the rate of heart beat
(B) Increasing the strength of ventricular contraction
(C) Both a and b
(D) Increasing the stimulation of vagus nerve

110. Parasympathetic neural signal decreases cardiac output by - **[Pg-287,E]**
(A) Decreasing the rate of heart beat
(B) Decreasing the speed conduction of action potential
(C) Both
(D) Increasing adrenal medulla hormones secretion

111. Heart beat increases - **[Pg-287,E]**
(A) On stimulation of sympathetic nerves
(B) On stimulation of vagus nerve (para sympathetic nerve)
(C) By adrenaline secreted by adrenal medulla
(D) Both a and c

Para-18.6 Disorders of Circulatory System

112. In adult, normal blood pressure is – **[Pg-287,E]**
(A) 80/120 mmHg (B) 100/80 mmHg (C) 120/80 mmHg (D) 100/ 120 mmHg

113. Normal BP= 120 / 80 mmHg in an adult. In this measurement 120 mmHg is the ____ pressure and 80 mmHg is _____ pressure- **[Pg-287,E]**
(A) Diastolic, systolic (B) Systolic, diastolic
(C) Pulse, diastolic (D) Pulse, systolic

114. Which one indicates B.P or hypertension? **[Pg-287,E]**
(A) 120/ 80 mmHg (B) 80/120 mmHg
(C) 140/90 mmHg or higher (D) 40/60 mm Hg

115. Match the Column I with Column II – **[Pg-287,M]**

	Column I		**Column II**
A.	Heart failure	I.	Heart muscle is suddenly damaged by an inadequate blood supply
B.	Cardiac arrest	II.	Chest pain due to inadequate 0 2 reaching the heart muscles

C.	Heart Attack	III.	Atherosclerosis
D.	Coronary Artery disease (CAD)	IV	Heart not pumping blood effectively enough to meet the needs of the body
E.	Angina pectoris	V.	Heart stops beating

	A	**B**	**C**	**D**	**E**
(a)	IV	V	III	I	II
(b)	V	IV	I	II	II
(c)	IV	V	III	I	III
(d)	V	IV	I	III	I

116. It is often referred as atherosclerosis, affects the blood vessels that supply blood to the heart muscles. It is caused by deposition of Ca, fat, cholesterol and fibrous tissues making the lumen of arteries narrow –
The above facts are related to- **[Pg-288,E]**
(A) CAD (B) SCIO (C) Blue baby (D) Heart arrest

117. **Assertion –** Nitroglycerin relieve chest pain caused by narrowing of the cardiac arteries.
Reason – The chest pain results from inadequate blood flow in coronary arteries. Vasodilation promoted by nitric oxide from nitroglycerin increases blood flow, providing the heart muscle with additional oxygen and thus relieving the pain. **[Pg-288,H]**
A) Both assertion and reason are true and reason is correct explanation of assertion
B) Both assertion and reason are true and reason is not correct explanation of assertion.
C) Assertion is true but reason is false.
D) Both assertion and reason are false

NEET PREVIOUS YEARS QUESTIONS

1. Match the items given in column I with those in column II and select the correct option given below. **[2018]**

Column I	**Column II**
A. Fibrinogen	(i) Osmotic balance
B. Globulin	(ii) Blood clotting
C. Albumin	(iii) Defence mechanism

(a) A-(iii); B-(ii); C-(i) (b) A-(i); B-(ii); C-(iii) (c) A-(ii); B-(iii); C-(i) (d) A-(i); B-(iii); C-(ii)

2. Match the items given in column I with those in column II and select the correct option given below: **[2018]**

Column I	**Column II**
A. Tricuspid valve	i. Between left atrium and left ventricle
B. Bicuspid valve	ii. Between right ventricle and pulmonary artery
C. Semilunar valve	iii. Between right atrium and right ventricle

(a) A-(iii); B-(i); C-(ii) (b) A-(i); B-(iii); C-(ii) (c) A-(ii); B-(i); C-(iii) (d) A-(i); B-(ii); C-(iii)

3. Adult human RBCs are enucleated. Which of the following statement(s) is/are most appropriate explanation for this feature? **[2017]**

(1) They do not need to reproduce. (2) They are somatic cells.
(3) They do not metabolize. (4) All their internal space is available for oxygen transport.
(a) Only (1) (b) (1), (3) and (4) (c) (2) and (3) (d) Only (4)

4. Reduction in pH of blood will **[2016]**
(a) reduce the rate of heart beat. (b) reduce the blood supply to the brain.
(c) decrease the affinity of haemoglobin with oxygen. (d) release bicarbonate ions by the liver.

5. Blood pressure in the pulmonary artery is **[2016]**
(a) same as that in the aorta. (b) more than that in the carotid.
(c) more than that in the pulmonary vein. (d) less than that in the venae cavae.

6. Which one of the following is correct? **[2015]**
(a) Serum = Blood + Fibrinogen (b) Lymph = Plasma + RBC + WBC
(c) Blood = Plasma + RBC + WBC (d) Plasma = Blood – Lymphocytes

7. Erythropoiesis starts in : **[2015]**
(a) Liver (b) Spleen (c) Red bone marrow (d) Kidney

8. Doctors use stethoscope to hear the sounds produced during each cardiac cycle. The second sound is heard when **[2015]**
(a) ventricular wall vibrate due to gushing in of blood from atria.
(b) semilunar valves close down after the blood flows into vessels from ventricles.
(c) AV node receives signal from SA node.
(d) AV valves open up.

9. Blood pressure in the mammalian aorta is maximum during **[2015]**
(a) diastole of the right ventricle. (b) systole of the left ventricle.
(c) diastole of the right atrium. (d) systole of the left atrium.

10. Which one of the following animals has two separate circulatory pathways? **[2015]**
(a) Lizard (b) Whale (c) Shark (d) Frog

11. How do parasympathetic neural signals affect the working of the heart? **[2014]**
(a) Reduce both heart rate and cardiac output.
(b) Heart rate is increased without affecting the cardiac output.
(c) Both heart rate and cardiac output increase. (d) Heart rate decreases but cardiac output increases.

12. What would be the heart rate of a person if the cardiac output is 5L, blood volume in the ventricles at the end of diastole is 100 mL and at the end of ventricular systole is 50 mL? **(NEET-2019)**
(1) 50 beats per minute (2) 75 beats per minute (3) 100 beats per minute (4) 125 beats per minute

13. Match the Column - I with Column -II **(NEET-2019)**

Column - I	**Column - II**
(a) P-wave	(i) Depolarisation of ventricles
(b) QRS complex	(ii) Repolarisation of ventricles
(c) T-wave	(iii) Coronary ischemia
(d) Reduction in the size	(iv) Depolarisation of of T-wave atria
	(v) Repolarisation of atria

Select the correct option-

(a) (b) (c) (d)	(a) (b) (c) (d)	(a) (b) (c) (d)	(a) (b) (c) (d)
(1) (iv) (i) (ii) (iii)	(2) (iv) (i) (ii) (v)	(3) (ii) (i) (v) (iii)	(4) (ii) (iii) (v) (iv)

14. In a marriage between male with blood group A and female with blood group B, the progeny had either blood group AB or B. What could be the possible genotype of parents? **(NEET-2019 ODISSA)**
(1) IAi (Male) : IBIB(Female) (2) IAIA (Male) : IBIB(Female)
(3) IAIA(Male) : IBi (Female) (4) IAi (Male) : IBi (Female)

15. All the components of the nodal tissue are autoexcitable. Why does the SA node act as the normal pacemaker? **(NEET-2019 ODISSA)**

(1) SA node has the lowest rate of depolarisation.
(2) SA node is the only component to generate the threshold potential.
(3) Only SA node can convey the action potential to the other components.
(4) SA node has the highest rate of depolarisation.

16. A specialised nodal tissue embedded in the lower corner of the right atrium, close to Atrio-ventricular septum, delays the spreading of impulses to heart apex for about 0.1 sec. The delay allows. **(NEET-2019 ODISSA)**

(1) blood to enter aorta.
(2) the ventricles to empty completely.
(3) blood to enter pulmonary arteries.
(4) the atria to empty completely.

17. Which of the following conditions cause erythroblastosis foetalis ? **(NEET-2020 COVID-19)**

(1) Mother Rh^{+ve} and foetus Rh^{-ve}
(2) Mother Rh^{-ve} and foetus Rh^{+ve}
(3) Both mother and foetus Rh^{-ve}
(4) Both mother and foetus Rh^{+ve}

18. Match the following columns and select the correct option **(NEET-2020)**

Column – I		Column – II	
(a)	Eosinophils	(i)	Immune response
(b)	Basophils	(ii)	Phagocytosis
(c)	Neutrophils	(iii)	Release histaminases, destructive enzymes
(d)	Lymphocytes	(iv)	Release granules containing histamine

	(a)	(b)	(c)	(d)		(a)	(b)	(c)	(d)
1.	(ii)	(i)	(iii)	(iv)	2.	(iii)	(iv)	(ii)	(i)
3.	(iv)	(i)	(ii)	(iii)	4.	(i)	(ii)	(iv)	(iii)

19. The QRS complex in a standard ECG represents : **(NEET-2020)**

1) Repolarisation of ventricles
2) Repolarisation of auricles
3) Depolarisation of auricles
4) Depolarisation of ventricles

20. Which enzyme is responsible for the conversion of inactive fibrinogens to fibrins **[NEET-2021]**

1. Renin 2. Epinephrine 3. Thrombokinase 4. Thrombin

21. Persons with 'AB' group are called as "Universal recipients". This is due to: **[NEET-2021]**

1) Absence of antigens A and B in plasma
2) Presence of antibodies, anti-A and anti-B on RBCs
3) Absence of antibodies, anti-A and anti-B in plasma
4)Absence of antigens A and B on the surface of RBCs

22. Given below are two statements:

Statement I: The coagulum is formed network of threads called thrombins.
Statement II: Spleen is the graveyard of erythrocytes.
In the light of the above statements, choose the most **appropriate** answer from the options given below:

1) Both Statements I and Statement II are correct
2) Both Statement I and Statement II are incorrect
3) Statement I is correct but Statement II is incorrect
4) Statement I is incorrect but Statement II is correct

23. Which one of the following statements is correct?

1) The atrio-ventricular node (AVN) generates an action potential to stimulate atrial contraction
2) The tricuspid and bicuspid valves open due to the pressure exerted by the simultaneous contraction of the atria
3) Blood moves freely from atrium to the ventricle during joint diastole.
4) Increased ventricular pressure causes closing of the semilunar valves.

24. Match List-I with List-II.

	List - I		List - II
(A)	Eosinophils	(I)	6 – 8%
(B)	Lymphocytes	(II)	2 – 3%
(C)	Neutrophils	(III)	20 – 25%
(D)	Monocytes	(IV)	60 – 65%

Choose the correct answer from the options given below :
(a)$A(IV), B(I), C(II), D(III)$
(b) A(IV), B(I), C(III), D(II)
(c)A(II), B(III), C(IV), D(I)
(d) A(II), B(III), C(I), D(IV)

[NEET 2023 Manipur]

25. Which of the following statements are correct?
A. Basophils are most abundant cells of the total WBCs
B. Basophils secrete histamine, serotonin and heparin
C. Basophils are involved in inflammatory response
D. Basophils have kidney shaped nucleus
E. Basophils are agranulocytes
Choose the correct answer from the options given below:

(a) C and E only
(b) B and C only
(c) A and B only
(d) D and E only

[NEET 2023]

26. Match List I with List II :

	List I		List II
A.	P wave	I.	Heart muscles are electrically silent.
B.	QRS complex	II.	Depolarisation of ventricles.
C.	T wave	III.	Depolarisation of atria.
D.	T-P gap	IV.	Repolarisation of ventricles.

Choose the correct answer from the options given below :
(a) A-I, B-III, C-IV, D-II
(b) A-III, B-II, C-IV, D-I
(c) A-II, B-III, C-I, D-IV
(d) A-IV, B-II, C-I, D-III

[NEET 2024]

27. Match List-I with List-II.

	List - I ECG		List - II (Electrical activity of heart)
(A)	P-wave	(I)	Depolarisation of ventricles
(B)	QRS complex	(II)	End of systole
(C)	T wave	(III)	Depolarisation of atria
(D)	End of T wave	(IV)	Repolarisation of ventricles

Choose the correct answer from the options given below :
(a)$A(IV), B(I), C(III), D(II)$
(b) A(I), B(IV), C(III), D(II)
(c) A(IV), B(III), C(I), D(II)
(d) A (III), B(I), C(IV), D(II)

[NEET 2023]

28. Match List I with List II.

	List I		List II.
(A)	P-wave	(I)	Beginning of systole
(B)	Q-wave	(II)	Repolarisation of ventricles
(C)	QRS complex	(III)	Depolarisation of atria
(D)	T-wave	(IV)	Depolarisation of ventricles

Choose the correct answer from the options given below :
(a) A-IV, B-III, C-II, D-I
(b) A-II, B-IV, C-I, D-III
(c) A-I, B-II, C-III, D-IV
(d) A-III, B-I, C-IV, D-II

29. Given below are two statements :

Statement I : Bone marrow is the main lymphoid organ where all blood cells including lymphocytes are produced.

Statement II : Both bone marrow and thymus provide micro environments for the development and maturation of T-lymphocytes.

In the light of above statements, choose the most appropriate answer from the options given below :
(a) Both Statement I and Statement II are correct.
(b) Both Statement I and Statement II are incorrect.
(c) Statement I is correct but Statement II is incorrect.
(d) Statement I is incorrect but Statement II is correct.

[NEET 2024]

30. Match List-I with List-II.

	List-I		**List-II**
A.	Emphysema	I.	Rapid
			muscle due to low
			Ca^{++}in body fluid
B.	Angina	II.	Damaged
	Pectoris		walls and decreased
			respiratory surface
C.	Glomerulo-	III.	Acute chest pain
	nephritis		when not enough
			oxygen is reaching
			to heart muscle
D.	Tetany	IV.	Inflammation
			glomeruli of kidney

Choose the correct answer from the options given below:
(a) A-III, B-I, C-IV, D-II
(b) A-III, B-I, C-II, D-IV
(c) A-II, B-IV, C-III, D-I
(d) A-II, B-III, C-IV, D-I

[NEET 2025]

NCERT LINE BY LINE QUESTIONS – ANSWERS

Q	**01**	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**
Ans	C	D	A	B	C	A	A	A	C	C
Q	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Ans	C	D	D	C	A	D	D	B	D	C

Q	21	22	23	24	25	26	27	28	29	30
Ans	A	A	D	B	C	C	B	A	B	A
Q	31	32	33	34	35	36	37	38	39	40
Ans	C	C	D	B	C	A	A	A	A	B
Q	41	42	43	44	45	46	47	48	49	50
Ans	B	D	C	C	D	D	A	B	A	D
Q	51	52	53	54	55	56	57	58	59	60
Ans	C	C	D	C	D	A	D	D	A	A
Q	61	62	63	64	65	66	67	68	69	70
Ans	A	C	D	B	C	B	B	A	D	A
Q	71	72	73	74	75	76	77	78	79	80
Ans	A	C	A	D	D	C	B	C	D	A
Q	81	82	83	84	85	86	87	88	89	90
Ans	A	D	A	B	A	D	A	C	D	D
Q	91	92	93	94	95	96	97	98	99	100
Ans	D	A	B	C	A	C	B	A	A	C
Q	101	102	103	104	105	106	107	108	109	110
Ans	C	B	C	D	A	A	A	C	B	B
Q	111	112	113	114	115	116	117			
Ans	D	C	B	C	B	A	A			

NEET PREVIOUS YEARS QUESTIONS-ANSWERS

1 (c) **2** (a) **3** (d) **4** (c) **5** (c) **6** (c) **7** (c) **8** (b) **9** (b) **10** (b)
11 (a) **12** (3) **13** (1) **14** (1) **15** (4) **16** (4) **17** (2) **18** (2) **19** (4) **20** (4)
21 (3) 22 (2) 23 (3) 24(c) 25(b) 26(b) 27(d) 28(d) 29(a) 30(d)

NEET PREVIOUS YEARS QUESTIONS-EXPLANATIONS

1. **(c)** Fibrinogen forms fibrin strands during blood coagulation. These strands forms a network and the meshes of which are occupied by blood cells. This structure finally forms a clot. Antibodies are derived from gamma-globulin fraction of plasma proteins which means globulins are involved in defence mechanisms. Albumin is a plasma protein mainly responsible for blood colloidal osmotic pressure (BCOP).

2. **(a)** Tricuspid valves [also called atrioventricular valve (AV valve] are present between right atrium and right ventricle in heart. Bicuspid valves (mitral valves) are present between left atrium and left ventricle. Semilunar valves are present at the openings of aortic and pulmonary aorta.

3. **(d)** In human RBCs, nucleus gets degenerated during maturation and it provide more space for oxygen carrying pigment (haemoglobin). It lacks many cell organelles including mitochondria so respires anaerobically.

4. **(c)** Reduction in pH of blood will decrease the affinity of haemoglobin with oxygen which in turn causes acidosis.

5. **(c)** Arteries have higher blood pressure than vein because blood is forced inside them from heart and also their lumen is narrow.

6. **(c)** Blood consists of plasma, RBC, WBC and platelets.

7. **(c)** Erythropoiesis is the process of formation of R.B.C. In the first month of pregnancy, yolk sac is the haemopoietic tissue. After 5 weeks, it is followed by the liver. Red bone marrow from 6 months onwards becomes the principal site of erythropoiesis.

8. **(b)** The second sound heard occurs when semilunar valves close down after the blood flows into vessels from ventricles.

9. **(b)** Blood pressure is maximum in aorta during systole of the left ventricle because the heart shrinks and pushes loads of blood into-aorta.

10. **(b)** Whale is a mammal. It has four chambered heart having two atria and two ventricles. Oxygenated and deoxygenated blood flow in separate circulatory pathways.

11. **(a)** Medulla oblongata has two regulatory centre:
(i) Accelerator centre - It functions through sympathetic nervous system (SNS) and increases heart beat by the secretion of epinephrine or adrenaline. (ii) Depressor centre - It functions through para sympathetic nervous system (PSNS) by the secretion of acetylcholine. It decreases heart beat, speed of conduction of action potential and thereby the cardiac output.

18. Eosinophils are associated with allergic reactions and release histaminase, destructive enzymes

Basophils secrete histamine, serotonin and heparin and are involved in inflammatory reactions

Neutrophils are phagocytic cells.

Both B and T lymphocytes are responsible for immune responses of the body

19. The QRS complex in a standard ECG represents the depolarisation of ventricles

20. During Coagulation
Fibrinogen $\xrightarrow{Thrombin}$ Fibrin

21. Option (3) is correct because persons with 'AB' blood group contain antigens 'A' and 'B' but lack antibodies anti-A and anti-B in plasma. So, persons with 'AB' blood group can accept blood from persons with AB as well as the other groups of blood due to lack of antibodies in their blood. Therefore, such persons are called "Universal recipients".

22. Coagulum by fibrin threads

23 During joint diastole Bi & Tricuspid valves are opened

24.Ans.(c)

Explanation

This question asks to match types of white blood cells (List I) with their usual proportion in the blood (List II).
The correct matchings are :
Eosinophils (A) - typically make up 1-6% of white blood cells, so the best match is (I) $6-8\%$
Lymphocytes (B) - typically make up 20-40% of white blood cells, but none of the options are in this range. However, since the other cells have more fitting matches, the remaining percentage (III) 20 - 25% would be the best fit.
Neutrophils (C) - these are the most common type of white blood cells, making up $50-70\%$ of all white blood cells, so the best match is (IV) $60-65\%$
Monocytes (D) - typically make up 2-8% of white blood cells, so the best match is (II) $2-3\%$
So, the correct answer is Option c : A-(I), B-(III), C-(IV), D-(II)

25.Ans.(b)

Explanation

The correct answer is Option b. B and C only.
Statement A is incorrect. Basophils are actually the least abundant cells of the total white blood cells (WBCs), not the most abundant.
Statement B is correct. Basophils do secrete histamine, serotonin, and heparin. Histamine and serotonin are involved in inflammatory response, while heparin is an anticoagulant.
Statement C is also correct. Basophils are involved in the inflammatory response. They release chemicals such as histamine and
serotonin that dilate blood vessels and attract other white blood cells to the site of inflammation.

Statement D is incorrect. Basophils do not have a kidney-shaped nucleus. That description is more appropriate for monocytes, another type of white blood cell.
Statement E is incorrect. Basophils are not agranulocytes. They are granulocytes, a category of white blood cells characterized by the presence of granules in their cytoplasm. Agranulocytes, which lack visible cytoplasmic granules, include lymphocytes and monocytes.

26.Ans.(b)
Explanation
The correct answer is option no. (b) as
A. P wave
- III. Depolarisation of atria.

B. QRS complex
- II. Depolarisation of ventricles.

C. T wave
- IV. Repolarisation of ventricles.

D. T-P gap
- I. Heart muscles are electrically silent.

27.Ans.(d)

Explanation
An ECG (Electrocardiogram) is a test that measures the electrical activities of the heart. Each wave in an ECG represents a certain part of the heart's electrical activity:
P wave: This wave occurs prior to the contraction of the atria (atrial contraction). It represents the depolarization of the atria.
QRS complex : This is a series of three graph deflections seen on a typical electrocardiogram. It corresponds to the depolarization of the ventricles, which initiates the ventricular contraction.
T wave : The T wave represents the repolarization (or recovery) of the ventricles.
By matching these descriptions with the options provided :
(A) P-wave - Depolarisation of atria (III)
(B) QRS complex - Depolarisation of ventricles (I)
(C) T wave - Repolarisation of ventricles (IV)
(D) End of T wave - End of systole (II)
So, the correct answer seems to be Option d : A-(III), B-(I), C-(IV), D-(II)

28.Ans.(d)
Explanation
- P-wave: Depolarisation of atria
- Q-wave: Beginning of systole
- QRS complex: Depolarisation of ventricles
- T-wave: Repolarisation of ventricles

29.Ans.(a)
- **Explanation**
- The correct answer is option no. (a) as both statements I and II are correct.
- In humans, the bone marrow is the main lymphoid organ where all blood cells including lymphocytes are produced.
- Both bone-marrow and thymus provide micro-environments for the development and maturation of T lymphocytes.
- Options (b), (c) and (d) are incorrect

30.Ans.(d)
Explanation

- Emphysema - Damaged alveolar walls and decreased respiratory surface
  Angina pectoris - Acute chest pain when not enough oxygen is reaching to heart muscle
  Glomerulonephritis - Inflammation of glomeruli of kidney
- Tetany - Rapid spasms in muscle due to low Ca^{++} in body fluid

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"The future belongs to those who explore the unseen — where biology meets innovation and discovery begins."