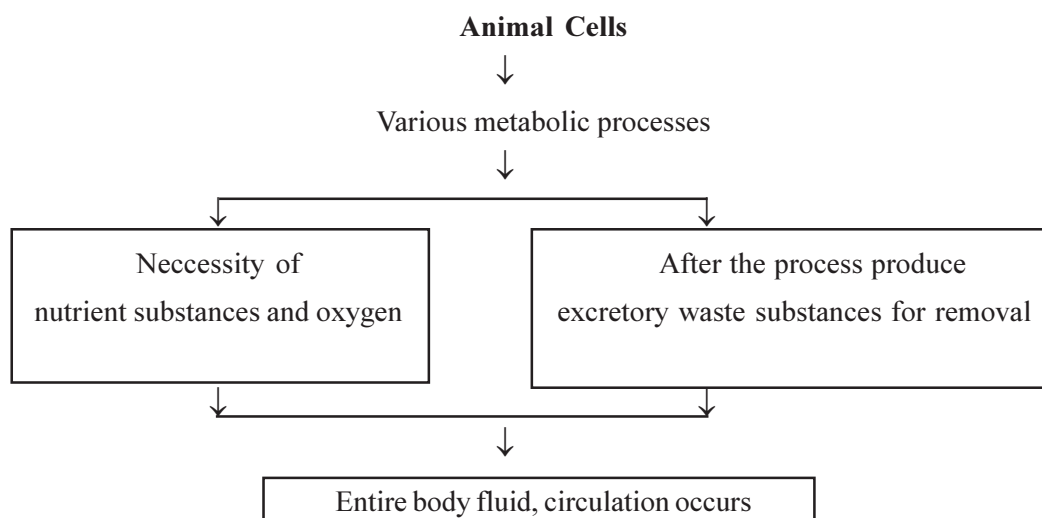




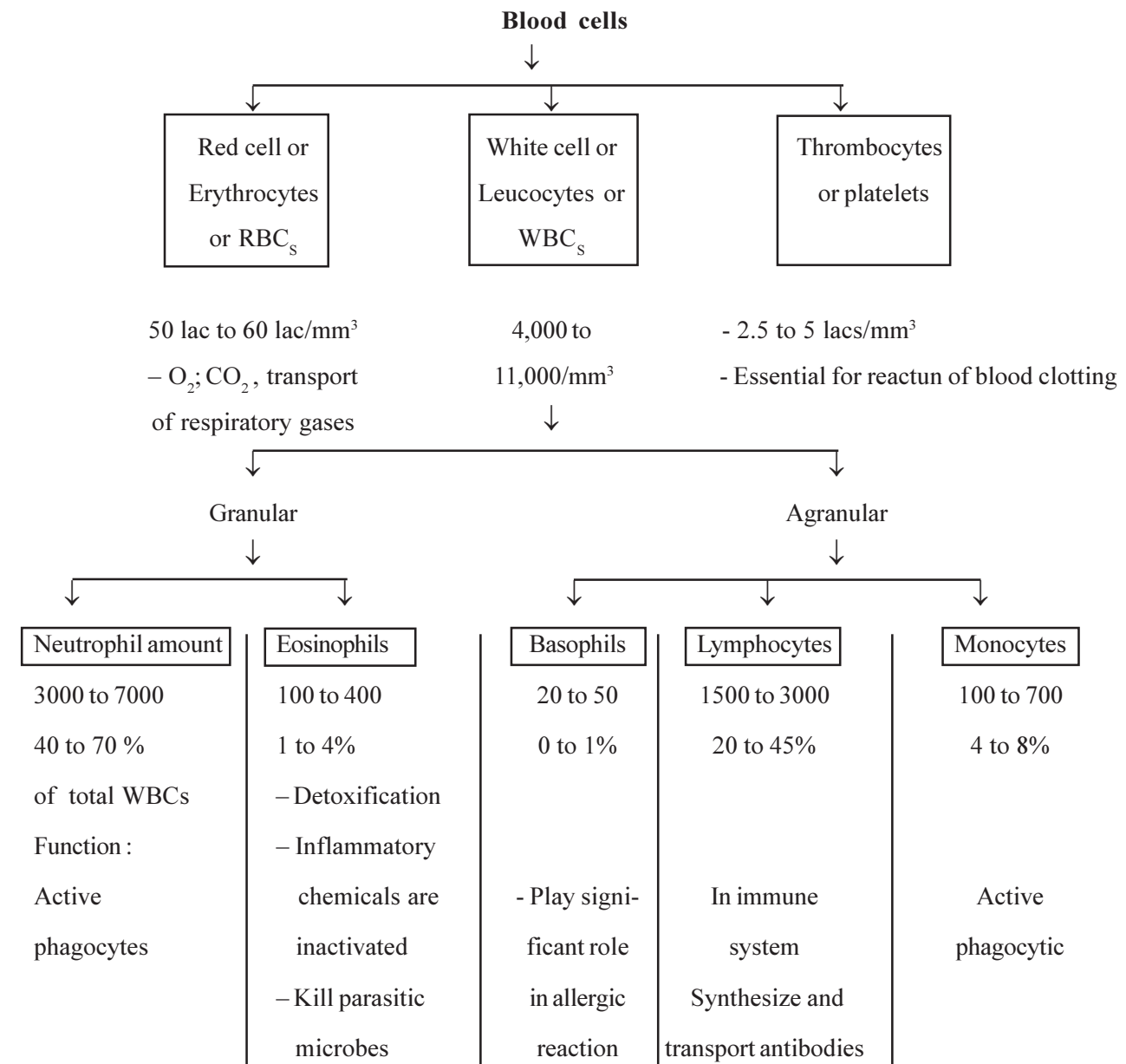
Body fluid - (Blood - Red - Blood plasma 55% , Blood cells - 45%)

Tissue fluid - Colourless - lymph

Blood :

- Liquid connective animal tissue
- Nearly 8 % of total weight of adult body.
- In man 5 to 6 liter blood average in volume.
- In female / woman 1 to 5 liter blood average in volume.

	Main Substance	Functions
Water		As a solvent, which is for the entrance substance in blood plasma.
Salts	$\left[\begin{array}{l} \text{Na}^+, \text{Ca}^{+2}, \text{Mg}^{+2}, \text{K}^+ \\ \text{HCO}_3, \text{Cl}^- \end{array} \right.$	Osmotic balance pH buffering Regulation of permeability of plasma membrane
Plasma	Fibrinogen	In blood (clotting)
Protein	Globulin	Immunity and transport
	Albumin	Regulation of osmosis and pH buffering.



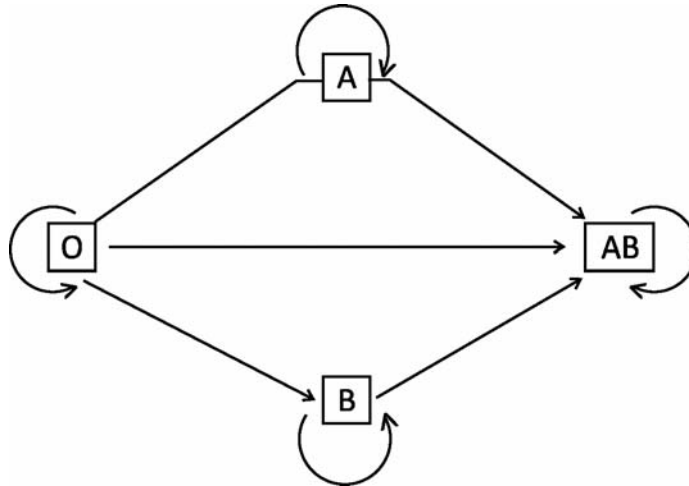
- (5) If p = neutrophil, q = Eosinophil, r = Basophils, s = lymphocytes, r = monocytes, then find true options for various leucocytes based on their numbers :
- (A) $p < s < t < q < r$ (B) $r < q < s < t < p$ (C) $t < r < s < q < p$ (D) $r < q < t < s < p$
- (6) State the percentage of blood cells (per mm^3) in the body, which inactivate chemicals, which produces burning sensation in the body.
- (A) 1500 - 3000 (B) 100 - 700 (C) 100 - 400 (D) 3000 - 7000
- (7) It has 4 to 8% of total WBC.
- (A) Monocytes (B) Lymphocytes (C) Eosinophils (D) Basophils
- (8) Name leucocyte having bilobed nucleus.
- (A) Acidophils (B) Basophils (C) Neutrophils (D) Monocytes
- (9) Name blood corpuscle without nucleus in human.
- (A) Erythrocytes (B) Leucocytes (C) Monocytes (D) Lymphocytes
- (10) State pH of Blood.
- (A) 4.7 (B) 6.7 (C) 7.4 (D) 3.7
- (11) What is approximate life span of erythrocytes ?
- (A) 120 days (B) 85 days (C) 40 days (D) 365 days
- (12) Of the following living organism, which lacks RBC in blood ?
- (A) Frog (B) Kangaroo - rat (C) Earthworm (D) Pigeon

Answers : (1-C), (2-B), (3-C), (4-B), (5-D), (6-C), (7-A), (8-B), (9-A), (10-C), (11-A), (12-C)

Blood Group

- Carl Landstiener discovered blood group in human.
- Four types of blood groups A, B, AB and O.
- In blood of person which type of antigen is present and which type of antibody is present, that two point are concentrated for the determined blood group.

Blood Group	Antigen	Antibody
A	A	anti b
B	B	anti a
AB	A and B	None of these
O	None	Anti a, Anti b

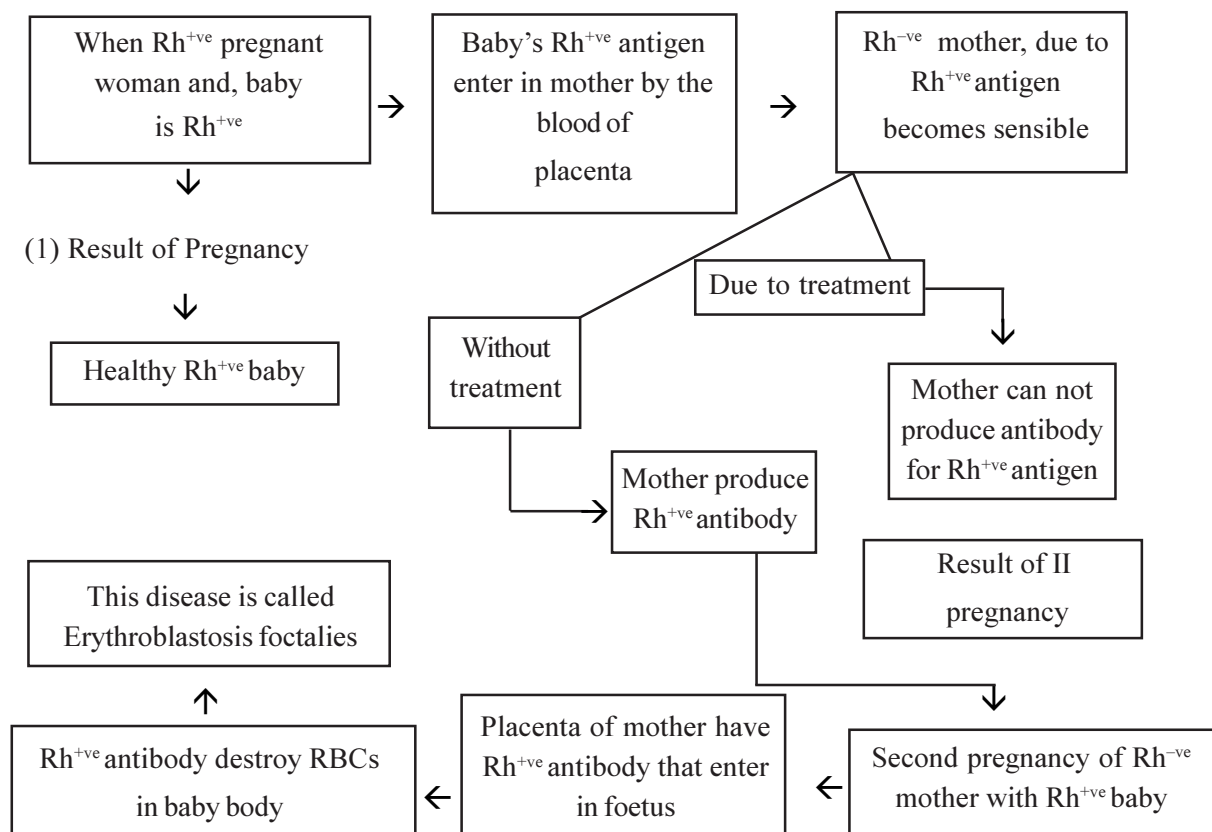


- Universal donor blood group is O.
- Universal acceptor / receptor blood group is AB.

Rh Group :

Human having Rh antigen on membrane of RBCs the

- person is called **Rh⁺**.
- If Rh antigen is absent so it is – (**Rh⁻**)
- This antigen was originally discovered in blood of Rhesus monkey.
- In human population 85% of people having Rh⁺ and 15% of people having Rh⁻
- Rh related problems are seen at the pregnancy time.



- (13) Which option is correct for the given statements X, Y and Z ?
- X : First child having Rh⁺ of Rh⁻ women, then Rh⁺ anti body should be introduced in woman's blood after the birth of child.
- Y : If such woman in second pregnancy carries Rh⁻ foetus , such child has possibility of haemolytic disease.
- Z : During first pregnancy Rh⁺ antibody is produced in her blood.
- (A) X and Y correct, Z false. Y is correct explanation of X.
- (B) X and Z correct, Y false. Z is correct reason for X.
- (C) X and Z correct, Y false. Z is not correct explanation for X.
- (D) X and Z false. Y is correct.
- (14) Mr Bean is seriously injured in accident, with tremendous loss of blood, there is no time for blood test. So Dr. Amish will advise which blood group for transfusion ?
- (A) AB⁺ (B) O⁺ (C) AB⁻ (D) O⁻
- (15) When is Rh⁺ antibody produced in Rh⁻ woman ?
- (A) When her second child is Rh⁻ (B) When her second child is Rh⁺
- (C) Her first child Rh⁺ (D) Her first child Rh⁻
- (16) Master Masum is suffering from erythroblastosis fits disease. What would be the blood group of mother ?
- (A) O⁺ (B) A⁻ (C) B⁺ (D) AB⁺
- (17) Which of the following marriage is not proper from biological view point ?
- (A) Rh⁺ Male, Rh⁺ female (B) Rh⁻ Male, Rh⁺ female
- (C) Rh⁻ Male, Rh⁻ female (D) Rh⁺ Male, Rh⁻ female
- (18) Person, having O blood group is called universal donor, as in his blood, on the surface of RBC
- (A) A antigen present (B) Only B antigen absent
- (C) Only O antigen present (D) A and B both antigen absent
- (19) If in blood plasma of person with A blood group mixed up with blood of person having B blood group then why blood gets more density?
- (A) antibody act as antitoxin. (B) Blood cells become more turgid.
- (C) Due to reaction of antibody antigen. (D) Overall increase in amount of antigen.
- (20) Which antigen enters through placenta into mother from child with erythroblastosis fits disease ?
- (A) Rh⁺ (B) Rh⁻ (C) Anti – A/a (D) Anti - AB/ab
- (21) Which blood corpuscles are destroyed in haemolytic child ?
- (A) White corpuscles (B) Red corpuscles (C) Blood platelets (D) Both A and C
- (22) Which leucocytes produces serum globulin ?
- (A) Monocytes (B) Thrombocytes (C) Lymphocytes (D) Basophils

- (23) State improper pair.
- (A) Basophils - Allergy (B) Monocytes - Active phagocytes
(C) Lymphocyte - Anti poisonous (D) Neutrophils - Active phagocyte
- (24) Number of blood corpuscles per mm³ associated with blood clotting.
- (A) 40 to 60 million (B) 5.5 to 7.5 million (C) 2.5 to 5 million (D) 3000 to 4000
- (25) Mention the percentage of blood corpuscles in blood having more lobulated nucleus.
- (A) 0 to 1% (B) 20 to 45% (C) 40 to 70% (D) 1 to 4%

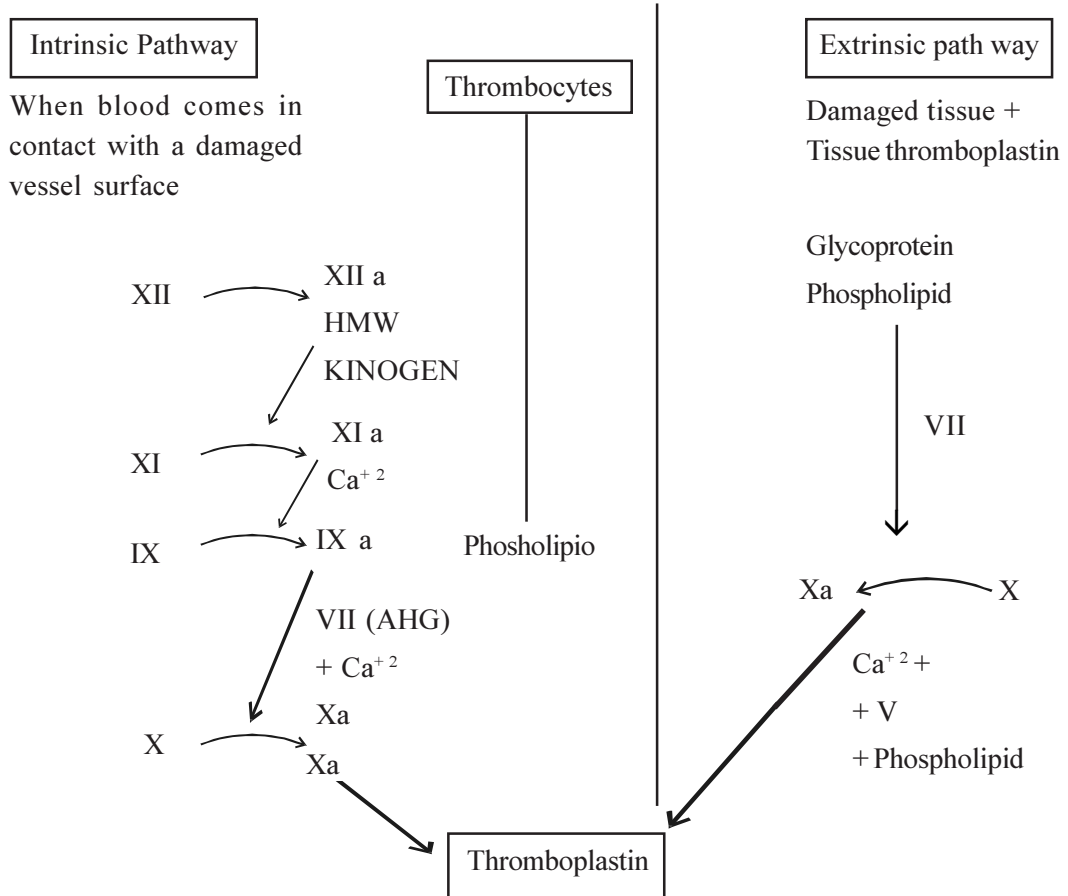
Answers : (13-B), (14-D), (15-C), (16-B), (17-D), (18-D), (19-C), (20-A), (21-B), (22-C), (23-C), (24-C), (25-C)

Coagulation of blood : The major chemical defence against blood loss is the formation of the bloodclot.

- The process in which the conversion of fluid like blood into jelly-like clot is called blood coagulation.
- Complex biological process.
- For this process blood plasma and tissues having 13 factors. Most of the factors play role in formation of thromboplastin by the active inducing principle.
- Numerical system for Nomenclature of blood clotting factors.

Roman Numerical Designation	Common Name	Activation product
I	Fibrinogen	Fibrin
II	Prothrombin	Thrombin
III	Thromboplastin	-
IV	Calcium	-
V	Proaccelerin	Accelerin (VI)
VII	Proconvertin	Convertin
VIII	Anti haemophilic globulin (AHG)	Activated AHG
IX	Christmas factor	Activated Christmas factor
X	Stuart factor	Activated stuart factor
XI	Plasma thromboplastin antecedent (PTA)	Activated (PTA)
XII	Hageman factor	Activate Hageman factor
XIII	Fibrin stabilizing factor (FSF)	Activated FSF

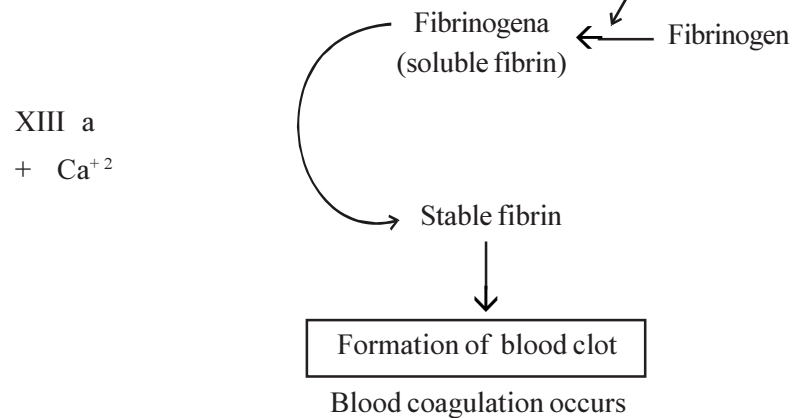
Phase - I



Phase - II

Prothrombin $\xrightarrow{\text{Thromboplastin}}$ Thrombin

Phase - III



- **External factors effected to blood coagulation :**
- Vitamin K (less amount)
- Heparin
- Defibrination
- Hirudin (Leech - Phylum - Annelida - Secreted from Pharynx of animal)

Intrinsic Pathway :

- Initiator factors which start this system produce from blood plasma.
- This type of Pathway for Coagulation, when blood in contact with surface of blood vessels, that is start.
- Initial factor : Hageman factor XII

Extrinsic Pathway :

- Initiated factors of this system are derived from outside the blood plasma (injured tissue)

Lymph:

- Surrounded fluid Fluid transport by the
to cells Lymphatic vessels
↓ ↓
Tissue fluid Lymph
- The Composition of lymph is very much like that of the blood plasma but the dissolved substances are in different concentrations.
- In lymph protein contents are low and it contains less fibrinogen than blood plasma.
- Lymph in the smallest capillaries have no cells.
- When lymph passes through the lymph nodes; cells are added in it.
- 99% small lymphocytes (agranular lymphocytes)
- 1% rarely erythrocytes; Eosinophils, monocytes (anucleated monocytes)

Function : Responsible for the immunity.

- Important carrier for nutrients, hormones etc.

(26) Lymph passed through lymph node is more beneficial from functional view point than lymph present in small lymph vessel ?

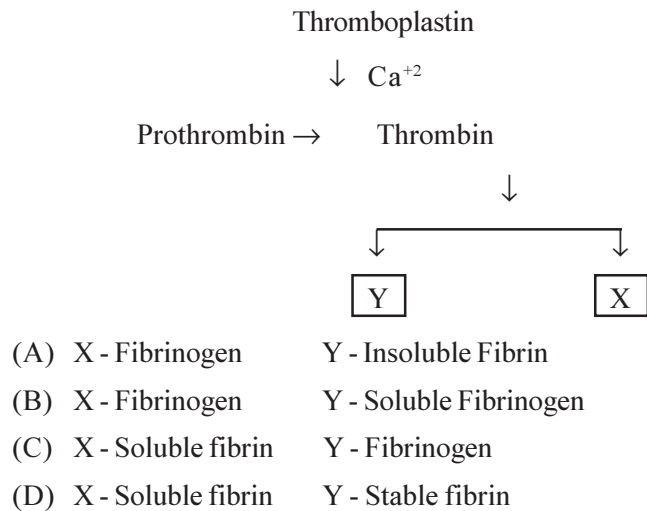
- (A) It has less amount of nutritive substances.
 (B) It has 99% RBC so necessary for respiration.
 (C) It has more fibrinogen so readily gets clotted.
 (D) It has immunity property.

(27) Of the following group which is essential stuart complex ?

- (A) Active X + Active VIII + Active X
 (B) Active X + Xa + phospholipid + Ca^{+2}
 (C) Active X + Active X + phospholipid + Ca^{+2}
 (D) Active X + VIII a + phospholipid + Ca^{+2}

- (28) Which factor for blood clotting is less in lymph than blood plasma ?
 (A) I (B) IV (C) X (D) XI
- (29) Thromboplastin is essential in human for blood clotting, from which cell it is obtained ?
 (A) RBCs (B) Platelets (C) lymphocytes (D) Neutrophils
- (30) It is function of thromboplastin.
 (A) Formation of fibrin from prothrombin (B) Formation of thrombin from prothrombin
 (C) Formation of fibrin from thrombin (D) Formation of prothrombin from thrombin
- (31) Initiation of formation of thromboplastin through extrinsic passage begins from
 (A) Blood corpuscles (B) Blood plasma (C) Injured tissue (D) A & B Both
- (32) Due to formation of stable fibrin in blood
 (A) Inhibits formation of blood nodules (B) Blood nodules dissolved in blood
 (C) Hard blood nodules formed (D) Maintains fluidity of blood
- (33) In which organism hirudin is normally observed ?
 (A) Ascaris (B) Leech (C) Salamander (D) Frog
- (34) Who prevents transformation of prothrombin into thrombin in uninjured blood vessel ?
 (A) Heparin (B) Soluble fibrin (C) XIII a factor (D) Thromboplastinogenase
- (35) Lymph has compare to blood plasma.
 (A) less amount of water
 (B) some protein factors and collagen in less amount
 (C) more amount of erythrocytes
 (D) more amount of eosinophils
- (36) Which of the following factor is absent in haemophilic patient ?
 (A) Factor XII (B) Factor X (C) Factor VIII (D) Factor II
- (37) For the activation of stuart factor by active christmas factor, help of which factor is obtained ?
 (A) Plasma thromboplastin antecedent (B) Antihaemophilic globulin
 (C) Proconvertin (D) Fribin stabilizing factor
- (38) Which of the following option is improper for factors participating in blood clotting through intrinsic passage ?
 (A) XII (B) VIII (C) VII (D) XI
- (39) Which components participate in the formation of thromboplastin ?
 (A) Injured tissue (B) Blood corpuscles (C) A and B (D) Thrombin

(40)



Answers : (26-D), (27-D), (28-A), (29-A), (30-B), (31-C), (32-C), (33-B), (34-A), (35-B), (36-C), (37-B), (38-C), (39-C), (40-C)

- **Circulatory system**
- **Type :**

Open type	Close type
• Absence of blood capillaries • Phylum = Arthropoda • Mollusca (except cephalopoda)	• Presence of blood capillaries • Phylum annelida • Vertebrates Animals

Pathway :

- Systemic circulation
- Pulmonary circulation

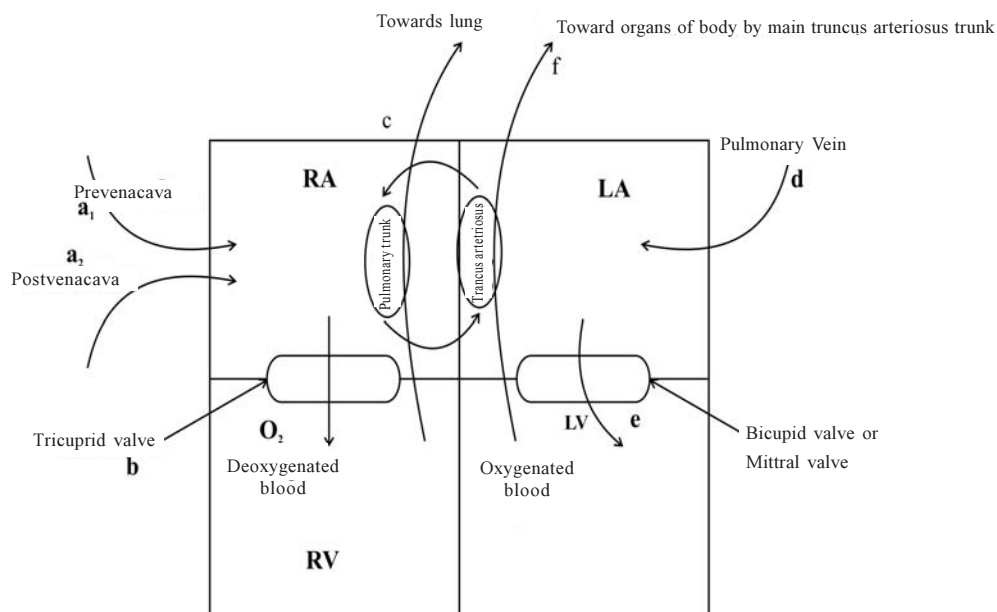
Heart :

- Size : 12 mm length, 9 cm broad, weight nearly 300g.
- Location : Between the two lungs arranged oblique in groove
- Shape : blunt coneshaped, hollow muscular organ
- Pericardium : bilayered - toward outer side : Fibrous coat
- **Toward inner side :** Serosa between the two layer.
There is a very narrow space which is filled with paricardial fluid which gives protection against - jerks and shocks.
- **Lobes :** Four lobes.

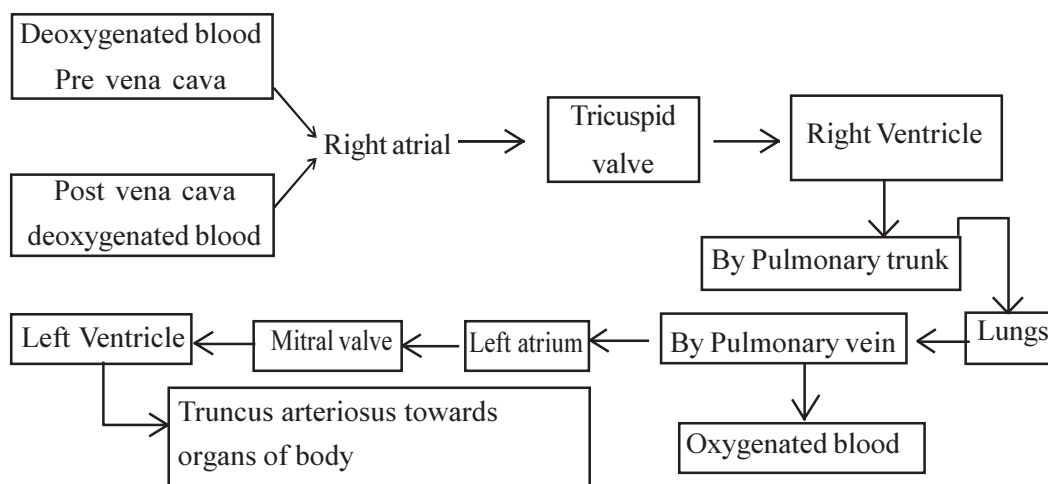
Right atrium	– R A	Righ ventricle	– R V
Left atrium	– L A	Left ventricle	– L V

Atria : Small in size, contain thin wall.
Ventricles : Large in size, contain thicker wall.
- (Wall of left ventricle is thicker than the wall of right ventricle)
- Two grooves present on ventricles
 - Anterior interventricular sulcus
 - Posterior inter ventricular sulcus.

- **Internal structure :**
- Septum between two atrial - Inter atrial septum
- Septum between two ventricles - Inter ventricular septum.
- Septum between atria and ventricles - Atrio ventricular septum.
- Tricupsid valve - Between the right atrial and right ventricle
- Bicupsid / mitral valve - Between the left atrial and left ventricle
- **Semilunar valves :**
- The valve present between right ventricle and pulmonary trunk is called pulmonary semilunar valve.
- A valve present between left ventricle and aorta arteriosis is called aortic semilunar valve.
- Haversian valve : Pre venacava protected by Haversian valve which opens in right atrium.
- The bacien valve : Postvena cava protected by Thebesian valve which opens in right atrium.
- Pulmonary veins are not protected by valves.
- **A Node :** Sinoatrial node : It is present in right upper corner of the right atrium which is like tissue mass.
- **AV Node :** Atrio - Ventricular Node : It is present in the lower left corner of the right atrium close to the atrio - ventricular septum which is like tissue mass.
- Bundles of HIS muscles in interventricular septum.
- Perkinje fibers - branches that emerge from the bundle of HIS.
- Double circulation : Discovered by William Harvey.
- Oxygenated and deoxygenated blood circulation is separated, so it is called double circulation.



Circulation : $a_1, a_2 \rightarrow b \rightarrow c \rightarrow d \rightarrow e \rightarrow f$



- **Double pump :** By the heart, blood circulate from the right lobes to left lobes of heart for the entry of blood it has to pass through lungs. Thus heart is called double pump. (Accumulation of blood in atria = suction pump blood circulate from ventricles towards various organs of body pressure pumps because
- Right lobes of heart pushes the blood in lungs.
- Left lobes of heart pushes the blood toward the entire body organs.
- **Systemic heart :** Left part of heart (eg. Left atrium and left ventricle) which supplies blood in various organs of body so it is known as systemic circulation and left part of heart is called systemic heart.
- Main aim of this circulation is circulation of O_2 as well as nutrient substances upto tissues of body and removal of CO_2 and other nitrogenous toxin substances.

Pulmonary heart :

- Right part of heart (eg. Right atrium and right ventricle) has blood which pulmonary circulation for oxygenation, blood absorption or suction. Thus this circulation is known as pulmonary circulation and right part of heart is called pulmonary heart. By pulmonary circulation impure, deoxygenated blood which suction in right atrium, which is responsible for oxygenation.

(41) Which option is correct with reference to statement X, Y and Z ?

Statement :

X – wall of left Ventricle is more muscular than right ventricle.

Y – Blood is transported to various body parts from left ventricle.

Z – Blood is transported to lungs from right ventricle.

- (A) X and Y correct, Z is wrong. (B) X is correct, Y and Z wrong.
 (C) X is wrong, Y and Z correct. (D) X, Y, Z all three are correct.
- (42) State the correct sequence of systemic transportation.
- (A) Right auricle - Right ventricle - Left auricle - Left ventricle
 (B) Left auricle - Left ventricle - body tissue system - vena cava - Right auricle
 (C) Right auricle - Right ventricle - Left auricle - Left ventricle
 (D) Left auricle - Left ventricle - lungs - Right ventricle - right auricle

- (43) Which valve is present in the aorta originating from ventricle ?
 (A) Semilunar (B) mitral (C) Tricuspid (D) Bicuspid
- (44) Which part of heart is more muscular ?
 (A) RA (B) LA (C) RV (D) LV
- (45) Near which valve in human heart only O₂ blood passes?
 (A) Pulmonary semilunar (B) Tricuspid valve (C) Bicuspid valve (D) A and B Both
- (46) Which fibres held bicuspid and tricuspid valve to its proper place ?
 (A) Bundle of His (B) Purkinje fibres (C) Chordae tendinae (D) A and B both
- (47) Which vein is responsible for reentry of blood to left side of heart?
 (A) Anterior Venacava (B) Pulmonary vein
 (C) Posterior Venacava (D) Renal portal vein
- (48) State the function of pulmonary artery.
 (A) Transport of oxygenated blood from heart to lungs.
 (B) Transport from left ventricle to body organs.
 (C) Deoxygenated blood is transported from heart to lungs.
 (D) Transport of O₂ blood from lungs to heart.
- (49) Exterenal layer of pericardial membrane is formed of
 (A) fibrous envelop (B) serosa (C) muscularis (D) mucosa layer
- (50) Blood emptied into heart by venacava Sequentially passes through which valve ?
 (A) Bicuspid valve - aortic arch - semilunar valve - mitral valve - pulmonary semilunar valve
 (B) Bicuspid valve - pulmonary semilunar valve - mitral valve - aortic arch - semilunar valve
 (C) Tricuspid valve - pulmonary semilunar valve - aortic arch - semilunar valve - mitral valve
 (D) Tricuspid valve - pulmonary semilunar valve - bicuspid valve - aortic arch - semilunar valve

Answers : (41-D), (42-B), (43-A), (44-D), (45-C), (46-C), (47-B), (48-C), (49-A), (50-D)

Cardiac cycle :

- In healthy man, 72 cardiac cycle occurs in 1 minute (72 time pulsation). 0.80 sec time occur for / cardiac cycle. Systole : Contraction of heart lobes. Diastole : Relaxation of heart lobes.

Time-gap	Atria	Ventricles
0.10 Sec	undergo systole	undergo diastole
0.30 Sec	undergo diastole	undergo systole
0.40 Sec	undergo diastole	undergo diastole

- Cardiac cycle is starts by contraction of atria.
- Ventricles accumulated by blood, it takes 0.10 sec.
- Atria accumulated by blood, it takes 0.70 sec.

- During the contraction of ventricles pressure arises due to this.
- From the right ventricle due to blood pressure semilunar valve of pulmonary trunk opens.
- From the left ventricle due to blood pressure semilunar valve of aortic trunk opens.
- At the time of contraction of both ventricles due to blood pressure tricuspid valve and bicuspid valve are closed.
- At the time of systole of atria through blood pressure tricuspid valve and mitral valve are open.
- At the time of diastole of ventricles through blood pressure semilunar valve closed.
- When closing of atrioventricular valve, lubb sound can hear.
- When closing of semilunar valve, dubb sound can hear.

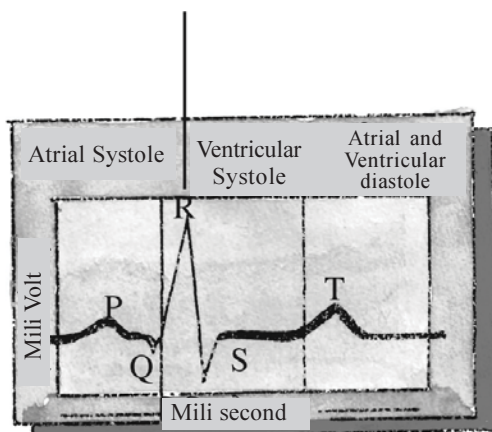
Electrocardiogram (ECG) : Discovered by Inthovan (1906)

The electrical charges induced in cardiac muscles during each cardiac cycle can be registered through electrodes arranged on the body surface. Such a recording is called - Electrocardiogram (ECG)

- Upward and downward directional curves arranged and produce ECG.

Uses : This is important method for checking the health or health related problems of heart.

- Electrodes are arranged at different places on the body. Normally they are placed on wrists and ankles. (by clamp)
- The appearance of ECG depends on particular placement of electrodes.



- P wave : Systole of atria.
- Stimulation situation SA node to atria.
- QRS waves : Systole of ventricle.
- T wave : It indicate diastole of ventricles. This time atria also goes for diastole situation.

Regulation of heart : Normally cardiac activity are auto regulated by nodal tissue.

- Heart of man is myogenic because nodal tissue has properties of nerve and muscular both.
- Sympathetic nervous system : Heart activity becomes faster (stimulate situation)
- Parasympathetic nervous system : Prevent heart activity (Increased pulsation becomes normal)
- Nodal tissue :
- Pulsation of heart process starts by it. So it is called “heart” of heart.
- It passes message of contraction of atria by every 0.80 sec; so it known as pacemaker (SA node).
- It keeps heart pulsation regulate and rhythmic. This stimulation reaches upto AV node by SA node.

AV node :

- From stimuli transport to bundle of His and purkinje fibers of heart by ventricle and by it contraction can occur.
- Failure of S.A. node causes transplants artificial pacemaker in thoracic region and keep heart pulsation control.

-
- (51) During one cardiac cycle, total how much time blood can be held by auricles ?
(A) 0.10 Sec (B) 0.30 Sec (C) 0.40 Sec (D) 0.70 Sec
- (52) What is indicated by P waves in ECG ?
(A) Contraction of ventricles (B) Relaxation of ventricles
(C) Contraction of auricles (D) Relaxation of all chambers
- (53) When Ventricle experiences systole
(A) Tricuspid and Bicuspid valve closes (B) All valve of right chambers of heart opens
(C) Bicuspid and aortic Semilunar valve opens (D) All four valve opens for separation of blood of body
- (54) Heart of heart
(A) pericardial membrane (B) SAN (C) AVN (D) brain
- (55) Improper for SAN
(A) It is called pacemaker
(B) Responsible for stimulation of auricles
(C) Keeps heartbeat rhythmic and regular
(D) Every 0.10 sec sends messages for contraction of auricles
- (56) State number of portal veins in human.
(A) 1 (B) 2 (C) 3 (D) Innumerable
- (57) State the passage of conduction of stimulation in heartbeating.
(A) SAN - AVN - Bundle of His - purkinje fibre
(B) SAN – Bundle of His - AVN - Purkinje fibre
(C) AVN – SAN - Purkinje fibre - Bundle of His
(D) SAN – Bundle of His – Purkinje fibre – AVN
- (58) State the characteristic of blood in heart at Diastole
(A) Oxygenated (B) De oxygenated (C) Both A and B (D) Arterial blood
- (59) During systole of ventricle
(A) blood enters into ventricle from auricles
(B) O₂ blood emptied in pulmonary artery deoxygenated blood emptied into aortic arch
(C) CO₂ Containing blood into aortic arch and blood without CO₂ emptied in pulmonary vein
(D) Deoxygenated blood into pulmonary arch and O₂ blood into aortic arch
- (60) Total diastole period of ventricle during one cardiac cycle
(A) 0.10 Sec (B) 0.40 Sec (C) 0.70 Sec (D) 0.50 Sec
-

- (61) When auricles experience systole
- (A) both Semilunar valve opens
 - (B) both AV valve opens
 - (C) only tricuspid and pulmonary semilunar valve opens
 - (D) only tricuspid and pulmonary semilunar valve opens

Answers : (51-D), (52-C), (53-A), (54-B), (55-D), (56-A), (57-A), (58-C), (59-D), (60-D), (61-B)

Disease Related to Blood Circulation :

(A) Hypertension : Blood pressure measured in radial artery of hand by sphygmomanometer.

- In a normal healthy person systolic pressure is 120 (i.e 120 mm hg) and diastolic pressure is 80; it is recorded as 120/80.
- Minor variations can occur in blood pressure 140/90. Which is considered as normal.
- Situation of Hypertension : If systolic blood pressure > 140 mm Hg. and diastolic blood pressure > 90 mm Hg. Situation is determined as hypertension.

Causes : Smoking, obesity

- Obesity : A person can be considered to be obese, when his weight is higher by 20% from the standard weight determined by age, height and other aspects. In such person more blood is to be supplied to tissues so blood pressure rises.
- Effects of Smoking : Nicotine mixed with blood causes
 - (1) Contraction of artery so increase in blood pressure.
 - (2) Decrease the absorption capacity of O₂ in lungs.
 - (3) By CO₂ carrying capacity of haemoglobin decreases.
- Atherosclerosis : Also known as hardening of arteries, silent killer.

Effect : Responsible for the heart attack and stroke of brain.

Treatment : Angioplasty, by-pass surgery.

- Responsible situation for disease : More blood pressure, smoking, diet with more fat etc. By this substances damage occur in lumens of blood vessels's endodermis below that layer lipid and particularly cholesterol like substances are stored and there produce plaque. In the lumens of wall of blood vessel groove form as a node. By the producing of plaque lumens of blood vessel becomes narrower and decreases blood flow. (So that organ can not getting proper amount of blood.)
- Plaque are of two types : (1) Thrombus : It is known as stable mode. (same place as a groove)
- **Embolus** : After formation of plaque which free from that place and if circulate in small blood vessels obstruct occurs in blood flow.

- **Arteriosclerosis** : The walls of artery become thick and inelastic due to deposition of cholesterol and calcium salts, such a brittle artery can break. The blood from it flows out and clots. Such clots may circulate in blood and may cause problem in some organ for blood flow.

-
- (62) Blood pressure is measured by which instrument ?
 (A) Sphigmo baro meter (B) Stethoscope (C) Spirometer (D) Sphigmomanometer
- (63) Diastolic pressure in healthy normal person is how much mmHg ?
 (A) 120 (B) 140 (C) 80 (D) 100
- (64) Considering physiological condition of normal healthy person, what will be blood pressure?
 (A) 90/140 mmHg (B) 140/90 mmHg (C) 80/120 mmHg (D) 158/98 mmHg
- (65) Which of the following option is improper for the effects of smoking ?
 (A) O₂ carrying capacity of haemoglobin reduces by CO.
 (B) Decrease O₂ accepting capacity of lungs.
 (C) Induces contraction of artery increases blood pressure.
 (D) Inhibits exchange of gases in excretory unit.
- (66) Which method is used for the treatment of atherosclerosis ?
 (A) Replacement of AV valve (B) Angiography (C) ECG (D) Angioplasty
- (67) Blood nodule formed by plaque start circulating in blood along its flow, it is called
 (A) thrombus (B) angiography (C) embolus (D) stroke
- (68) It is most dreadful in human -
 (A) Thrombus (B) Angiography (C) Callus (D) Embolus
- (69) Patient of atherosclerosis disease have cholesterol stored in in the form of plaque ?
 (A) Endothelium (B) Mesothelium (C) Epithelium (D) B and C Both
- (70) Hardening of arterial wall is observed in which disease ?
 (A) Atherosclerosis (B) Arteriosclerosis (C) Hypertension (D) Silent killer
- (71) How is veins are differentiated from arteries ?
 (A) Very narrow lumen (B) Strong and muscular wall
 (C) Valves are present to control blood flow (D) Dark coloured wall

Answers : (62-D), (63-C), (64-B), (65-D), (66-D), (67-C), (68-D), (69-B), (70-B), (71-C)

A = Statement, R = Reasoning type questions

Select the answer for questions given below from the options given here.

- (A) A and R right, R is explanation of A.
 (B) A and R right, but R is not explanation of A.
 (C) A is right, R is wrong.
 (D) A is wrong, R is right.

- (72) Statement A : In each artery of human pure blood is circulated.
 Reason R : Left chambers of heart in human receives pure blood.
 (A) (B) (C) (D)

- (73) Statement A : CO reduces O₂ carrying capacity of haemoglobin.
Reason R : Nicotine induces contraction of arteries and increases blood pressure.
(A) (B) (C) (D)
- (74) Statement A : In cockroach, open circulatory system is present.
Reason R : Blood capillaries are absent in cockroach.
(A) (B) (C) (D)
- (75) Statement A : Human heart is called double pump.
Reason R : In human heart, blood flows from right auricle to right ventricle and left auricle to left ventricle.
(A) (B) (C) (D)
- (76) Statement A : SA node is pacemaker.
Reason R : SA node initiate heart beat.
(A) (B) (C) (D)
- (77) Statement A : Heart attack is under the effect of atherosclerosis.
Reason R : Cardiac arteries supplying blood to heart lumen totally or partially obstructed.
(A) (B) (C) (D)
- (78) Statement A : Mr. Iyer, call Jethalal obese person.
Reason R : Weight of Jethalal, according to his age, height and other things is 27% more.
(A) (B) (C) (D)
- (79) Statement A : Pulmonary veins carry blood containing CO₂.
Reason R : Oxygenated blood is circulated in aortic arch.
(A) (B) (C) (D)
- (80) Statement A : In the process of blood clotting, soluble fibrin is converted into stable fibrin.
Reason R : Active Hagmen factor activates PTA.
(A) (B) (C) (D)
- (81) Statement A : Normally lymph is responsible for immune reaction.
Reason R : Lymph has 99 % small lymphocytes.
(A) (B) (C) (D)

Answers : (72-D), (73-B), (74-A), (75-B), (76-A), (77-A), (78-A), (79-D), (80-B), (81-C)

True - False (T - F) type questions

Select proper option for true or false in the following sentences.

- (82) (1) Blood group is determined based on antigen present in blood serum.
(2) Rh^{-ve} antigen are present on the surface of RBC.
(3) Child with haemolytic disease has Rh^{-ve} factor's antibody in their blood.
(4) IX + VIII + phospholipid + Ca⁺² is present as essential factor christmas stimulating complex.
(A) TFTF (B) TTFT (C) FFTF (D) FFTT

- (83) (1) Blood is partially acidic fluid.
 (2) Hirudin present in human prevents blood clotting.
 (3) In right chambers of heart deoxygenated blood flows.
 (4) Pericardial fluid maintains concentration of blood in left chambers of heart.
 (A) TFFT (B) TFTF (C) TFFF (D) FFFF
- (84) Check the truth regarding AV node in following statements.
 (1) Stimulation arising in it, spreads into bundle of HIS muscles.
 (2) It sends stimulation to SA Node.
 (3) It sends message for initiating contraction of auricles.
 (4) It initiates heart beating.
 (A) TFFT (B) TFFF (C) FFFF (D) TFFT
- (85) (1) In arteriosclerosis disease blood clots, when come out and such clots are circulated in the blood
 (2) In obese person more blood plasma is required by tissue so blood pressure increases
 (3) SA - node is called heart of heart.
 (4) Relaxation of ventricle is possible by Purkinje muscle and bundle of His muscles.
 (A) TFFT (B) TTTF (C) FTTF (D) FTTT

Answers : (82-C), (83-D), (84-B), (85-B)

- (86) In column-I different types of blood cells are given and in column-II functions of blood cells are given. Match the proper pair for column-I from column-II.

Column-I		Column-II		I	II	III	IV
I	Lymphocytes	P	Active phagocytes	(A) R	Q	P	S
II	Monocytes	Q	Transports respiratory gases	(B) R	P	Q	S
III	Erythrocytes	R	Part of immunity system	(C) R	S	P	Q
IV	Eosinophils	S	Nullifies effect of poison	(D) P	Q	R	S

- (87) In column-I Roman letters are given for factors of blood plasma. In column-II name of factors are given. Match column-I with column-II.

Column-I		Column-II		I	II	III	IV
I	XIII	P	Calcium	(A) S	P	Q	R
II	IV	Q	Proconvertin	(B) P	S	Q	R
III	VII	R	Plasma thromboplastin antecedent	(C) S	P	R	Q
IV	XI	S	Fibrin Stabilizing factor	(D) S	Q	P	R

- (88) Match the proper pair from column-I and column-II

Column-I		Column-II		I	II	III	IV
I	O	P	Absence of antibody in blood plasma	(A) Q	S	P	R
II	A	Q	Anti A and anti b	(B) P	R	Q	S
III	AB	R	Anti a	(C) P	S	R	Q
IV	B	S	Anti b	(D) Q	P	S	R

- (89) Match the proper pair for blood vessel and it's functions given below

Column-I		Column-II		
I	Pulmonary vein	P	Regulation of blood flow in right chambers of heart	
II	Tricuspid valve	Q	Obtain O ₂ blood from left ventricle	
III	Anterior venacava	R	Deoxygenated blood emptied in right ventricle	
IV	Aortic arch	S	transport of O ₂ blood	
	I	II	III	IV
(A)	S	R	P	Q
(B)	Q	P	R	S
(C)	S	P	R	Q
(D)	P	Q	R	S

- (90) Find proper Sentence for X, Y, P, Q labelled parts of given diagram.

- (A) X - First sound
responsible for LUB
- (B) Y - Prevent flow of blood
from left auricle to left ventricle
- (C) P - When ventricle show
diastole, valve open
- (D) Q - de O₂ blood
passes from here

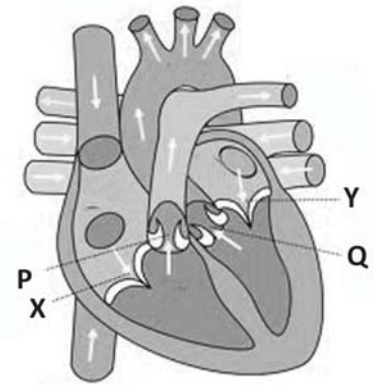


Figure 1

- (91) Find the proper option for X and Y labelled part in the given diagram.

- | | |
|-------------------|-------------|
| X | Y |
| (A) Bile pigments | Mesothelium |
| (B) Cholesterol | Endothelium |
| (C) Mesothelium | Cholesterol |
| (D) Endothelium | Mesothelium |

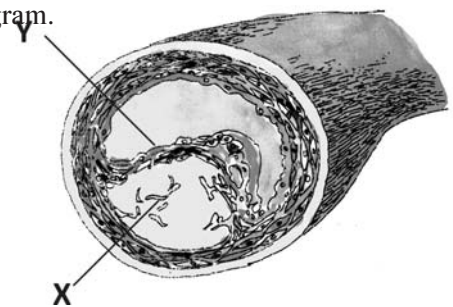


Figure 2

- (92) Find the proper option for P, Q, R, S labelled part in the given diagram - 3.

- (A) P - obtain blood from LV
- (B) Q - give blood to LV
- (C) S - give blood to RA
- (D) R - obtain blood from LA

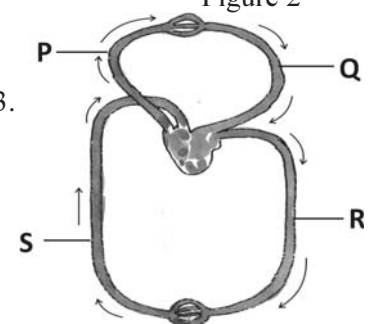


Figure 3

(93) Name the scientist, who has shown blood circulation passage given in diagram - 4.

- (A) Carl landsteiner
- (B) William parnas
- (C) Thomas harvey
- (D) William harvey

(94) blood passes through labelled part X-

- (A) Diastole of right auricle
- (B) Systole of left auricle
- (C) Systole of right ventricle
- (D) Systole of left ventricle

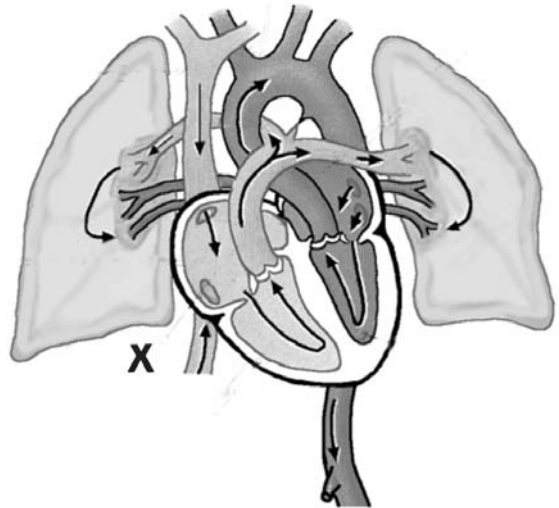


Figure - 4

(95) Identify Atrio ventricular - nodule tissue in given diagram - 5.

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

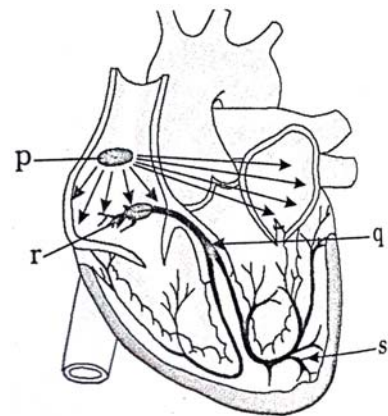


Figure - 5

(96) In the given diagram - 6 which labelled part transports O_2 blood ?

- (A) W
- (B) X
- (C) Y
- (D) Z

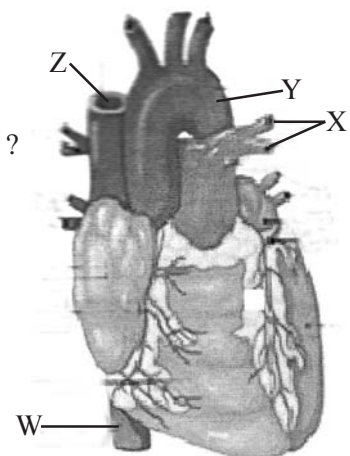
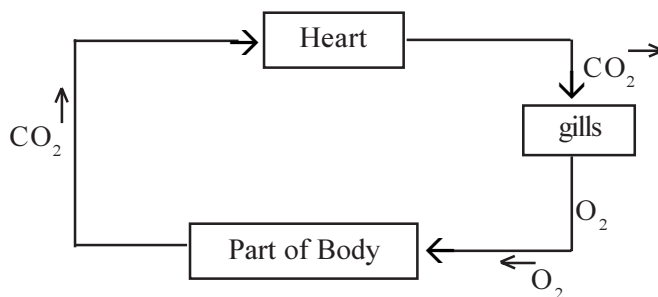


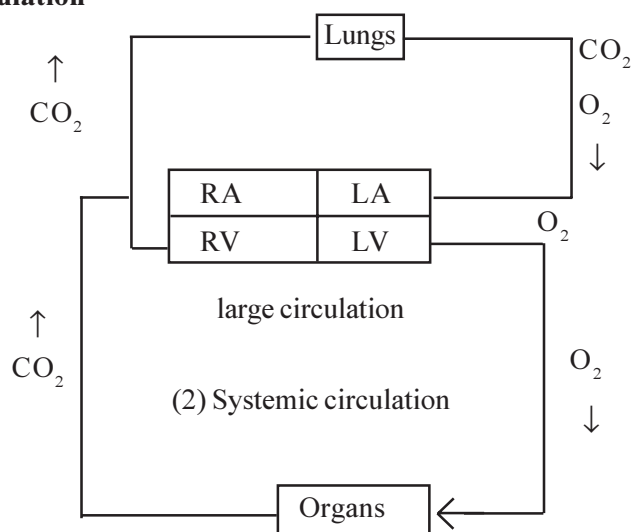
Figure - 6

Answers : (86-B), (87-A), (88-A), (89-C), (90-A), (91-B), (92-C), (93-D), (94-C), (95-C), (96-C)

- Study of circulatory system is known as Angiology.
- Double circulation discovered by William Harvey. He proposed heart as a pumping station of body.
- For unipath flow : eg. fish.



Double Circulation



- Pulmonary artery and systemic arch cross to each other and at the crossing point they connected with each other by ligamentum arteriosum.
- During the embryonic development in inter atrial septum oval foramen hole is present and after birth it can not be closed so deficiency can occur in baby. Blood of both atrial mixed in each other and decreases the amount of supplies of O_2 and symptoms of cyanosis can develop (blue colour of skin can occurs. This type of baby is known as ‘bluebabies.’

Pulsation of heart :

Organism	Pulsation per min	Organism	Pulsation per min
Adult man	72	Shrew	600 – 800
Embryo	160	Blue whale	25
New born baby	120 – 140	Elephant	28
Child	100	Sparrow	500
Rabbit	210	Canary bird	1000
Rat	400 – 600		

- Pulsation of heart of animals related.
- In mammals pulsation are more of small animals.
- During the physiological process numbers of pulsation are different. (stressful stage-resting stage)

- **Neurogenic heart** - eg. Arthropoda, some animals of annelida, phylam.

Myogenic heart - eg. Human being

	Neurogenic heart	Myogenic heart
1.	In heart impulse of pulsation come out from the heart.	– Impulses of heart pulsation develop only in heart.
2.	Impulses origin by nervous system.	– Impulses origin by specific muscular tissue.
3.	Nerve fibers are spread on the heart and contraction and relaxation can occur.	– In it specific type of muscles spread impulses.
4.	If heart is removed from the body, then pulsation of heart stops.	– If removal of heart from the body, gives sufficient nutrient, and favourable condition, it give pulses for few time

Control / Regulation of heart beats :

Endocrine regulation : Adrenalin = $\uparrow$ rate (Increase)

Noradrenalin = $\uparrow$ rate (Increase)

Vagus stimulate acetyl coline = $\downarrow$ rate (Decrease)

Autonomous nervory system : Sympathetic = $\uparrow$ rate (Increase)

Parasympathetic = $\downarrow$ rate (Decrease)

Tachycardia : Averagely, in adult man one of the situation can arise where heart pulsation per minute is more than 90. During the fever increase in the temperature of body rate of metabolism can increase and thus spontaneously stimulation and rythamacity also increase.

• Bradycardia : In adult man where average heart pulsation average below the 60 per minute.

• In common situations heart rate and respiration rate ratio is 4 : 1.

• 0.8 sec time for one cardiac cycle in man.

(1) Atrial systole = 0.1 Sec
(2) Atrial diastole = 0.7 Sec } 0.8 Sec

(3) Ventricle systole = 0.3 Sec
(4) Ventricle diastole = 0.5 Sec } 0.8 Sec

- Volume of blood related to heart :

Volume of blood related to heart :

• 120ml volume of each ventricle is called End Diastolic Volume (EDV)

• During the systole becomes empty while nearly 70 ml volume decrease, it is called stroke volume (SV).

• Remaining volume in ventricle nearly 50 ml, it is called End Systolic Volume (ESV) other systolic volume.

• Ejection fraction (EF) = $\frac{ESV}{EDV} = \frac{70}{120} = 0.583$

$\therefore$ 60 %

$$\begin{aligned}
 \text{Stroke Volume : (SV)} &= \text{EDV} - \text{ESV} \\
 &= (120 - 50) \text{ ml} \\
 &= \text{nearly } 70 \text{ ml}
 \end{aligned}$$

During the one pulsation 70 ml blood from ventricle towards the organs.

$$\begin{aligned}
 \text{Cardiac Output (CO)} &= \text{Stroke Volume} \times \text{Heart Beats} \\
 &= 70 \times 72 \\
 &= 5040 \text{ ml} \\
 &= \text{nearly } 5000 \text{ ml} \\
 \text{CO : } &5 \text{ lit / min}
 \end{aligned}$$

- **Feeling of heart (ventricle) :** Commonly blood flow from venacava towards atria. Approximate 75% of blood directly from the atria to ventricle passes. That's why contraction of atria can occur before that blood flow can occur. After that contraction of atria can occur and ventricles are full by 25% of more blood.
- Systolic duration of atria - 25 % Ventricles are filled.
- Diastolic duration of ventricles - 75% Ventricles are filled.
- Diastolic of ventricles - First phase - 70% (Rapid transport)
 - Second phase - 5% (Open Av.valves)
 - Final phase - 25% (Due to contraction of atria)
- Spleen : Biggest lymphnode of the body. Blood bank of body.
- Graveyard of RBCs . Origin from mesoderm of embryo
- One specific connective tissue found in spleen, which is known as Reticulo endothelial tissue or splenic pump.
- Splenic pump has two parts : (1) White pulp (2) Red pulp.
- Pulp of spleen have large phagocytic cells which are called macrophage cells.

Functions :

- (1) Senescent blood cells, dead or living microbes or disease infact microbe and waste material of cell are swallowed by macrophage.
- (2) RBCs are formed in embryonic stage.
- (3) Several antibodies synthesis here.
- (4) In adult stage spleen act as a blood bank. Its sinuses act as a reservoir of blood. When required blood is transported in circulation.

- (5) Storage of iron occur in spleen.
- (6) At the time of malaria, increase the volume of spleen because increases the number of lymphocytes and dead RBCs.
- Spleen, liver, kidney three are known as instruments of filtration.
-

Questions for NEET

- (97) Which cells produces thrombokinasase ?
 (A) Erythrocytes (B) leucocytes
 (C) Blood corpuscles (D) Endothelium of blood capillaries
- (98) State the name of valve, in post-vena cava which opens in right auricle in mammals.
 (A) Mitral valve (B) Thabius valve (C) Tricuspid valve (D) Austatian valve
- (99) State the reason of murmur sound in heart.
 (A) Pulsation of veins (B) Defect in valve
 (C) Thromboplastin (D) Less developed auricle
- (100) Thromboplastin is produced by
 (A) Injured tissue (B) Blood corpuscles (C) Both A and B (D) Prothrombin
- (101) Which situation is responsible for leukaemia ?
 (A) Percentage of WBC less than $5000/\text{mm}^3$. (B) Bone marrow is destroyed.
 (C) lymphocytes reduced by 2 to 5 %. (D) WBC increases by $6000/\text{mm}^3$.
- (102) Which situation is responsible for blood clotting ?
 (A) Destruction of RBC (B) Destruction of WBC
 (C) Destruction of lymphocytes (D) Change in component of lymph
- (103) When auriculo - Ventricular valve closes, which sound is hear ?
 (A) Dubb (B) Lubb (C) lubb-dubb (D) Dhakdhak
- (104) More than normal amount of leucocytes, indicates which condition ?
 (A) Anemic (B) Infection
 (C) Protection against bacteria (D) Effect on erythrocyte production
- (105) Which of the following organism has red coloured blood without RBC ?
 (A) Frog (B) Human (C) Cockroach (D) Earthworm
- (106) Pressure of blood vessels is
 (A) Diastolic pressure (B) Systolic pressure
 (C) Difference of B and A (D) Pressure in vena cava
- (107) Blood entering from lungs into heart by pulmonary vein, has more amounts of
 (A) RBC in 1ml blood (B) Hb in 1ml Blood
 (C) O_2 in 1ml blood (D) Nutritive substance in 1ml
- (108) State the location of fovea ovalis
 (A) Inter auricular septum (B) Intra ventricular septum
 (C) Right intra auriculo - ventricular septum (D) Left intra auriculo - ventricular septum

- (109) Beginning and end of hepatic portal system
 (A) Digestive system to liver (B) Kidney to heart (C) Liver to heart (D) Kidney to liver
- (110) What is called blood vessel, shows blood circulation begins from capillary and ends in capillaries ?
 (A) Portal system (B) Hepatic circulation (C) Cardiac circulation (D) All of above
- (111) Which of the following organ is death-place for R.B.C. ?
 (A) Kidney (B) Spleen (C) Bone marrow (D) Pancreas
- (112) Which type of leucocytes are linked with secretion of Histamine and heparin ?
 (A) Neutrophils (B) Basophils (C) Acidophils (D) Monocytes
- (113) What are stages of cardiac cycle ?
 (A) Auricle systole - ventricle systole - auricle - ventricle systole
 (B) Diastole - auricle systole - ventricle diastole
 (C) Auricle systole - ventricle diastole - ventricle systole
 (D) Ventricle diastole - auricle diastole - ventricle systole - auricle systole
- (114) Billirubin and biliverdin is byproduct of dissociation of
 (A) myoglobin (B) lipid (C) carbohydrate (D) haemoglobin
- (115) Increase in percentage of erythrocyte is called
 (A) Poly cythemia (B) leucocytopenia (C) Anaemia (D) leucopenia
- (116) Double circulation of blood in heart of normal, healthy person is per minute.
 (A) 8 (B) 16 (C) 32 (D) 72
- (117) is called father of cardio vascular system.
 (A) Wharvey (B) S harvey (C) S thomas (D) Landsteneir
- (118) When is difficulty observed in blood circulation ?
 (A) Antigen absent in RBC (B) Antibody absent in blood plasma
 (C) If antigen is opposite to antibody (D) If antigen - antibody are similar type
- (119) When dupp sound of heart is heard ?
 (A) When mitral valve opens
 (B) When mitral valve closes
 (C) When semilunar valve, situated at anterior part of aortic arch closes
 (D) When tricuspid valve opens
- (120) Output of heart is determined by
 (A) heart - beats (B) size of stroke (C) blood circulation (D) both A and B
- (121) Regulation of blood pressure is by
 (A) pituitary gland (B) adrenal gland (C) thymus gland (D) parathyroid gland
- (122) Pericardial fluid is secreted from
 (A) myocardium (B) Lateral diaphragm
 (C) Visceral membrane (D) pericardial membrane

Answers : (97-C), (98-D), (99-B), (100-C), (101-A), (102-C), (103-B), (104-B), (105-D), (106-C), (107-C), (108-A), (109-A), (110-A), (111-B), (112-B), (113-C), (114-D), (115-A), (116-D), (117-A), (118-D), (119-C), (120-D), (121-B), (122-D)

