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Body Fluids and Circulation

TOPIC 1

Blood

- 01** Persons with 'AB' blood group are called as "universal recipients". This is due to **[NEET 2021]**

- (a) absence of antigens-A and B on the surface of RBCs
- (b) absence of antigens-A and B in plasma
- (c) presence of antibodies, anti-A and anti-B on RBCs
- (d) absence of antibodies, anti-A and anti-B in plasma

Ans. (d)

Person with AB blood group are universal recipient because they do not have any antibodies to anti-A and anti-B in their blood hence they can receive blood from a donor of any blood type.

During transfusion, plasma is matched to avoid A and B antibodies in the transfused plasma that will attack the recipient's red blood cells. Person with AB blood type does not contain A and B antibodies in plasma. Therefore, they are also called universal plasma donors.

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

- (a) Thrombin
- (b) Renin
- (c) Epinephrine
- (d) Thrombokinas

Ans. (a)

Plasma contains prothrombin and fibrinogen. During clotting, inactive prothrombin converts to active thrombin.

Thrombin acts as a proteolytic enzyme to convert soluble plasma protein fibrinogen molecule produced from the liver in the presence of vitamin-K to form insoluble fibrin monomer.

- 03** Match the following columns and select the correct option.

[NEET (Sep.) 2020]

Column I	Column II
A. Eosinophils	1. Immune response
B. Basophils	2. Phagocytosis
C. Neutrophils	3. Release histaminase destructive enzymes
D. Lymphocytes	4. Release granules containing histamine

- | | | | | |
|-----|---|---|---|---|
| | A | B | C | D |
| (a) | 4 | 1 | 2 | 3 |
| (b) | 1 | 2 | 4 | 3 |
| (c) | 2 | 1 | 3 | 4 |
| (d) | 3 | 4 | 2 | 1 |

Ans. (d)

Option (d) is the correct. It can be explained as follows

Eosinophils are associated with allergic reactions and release histaminase, destructive enzymes. Basophils secrete histamine, serotonin, heparin, etc. and are involved in inflammatory reactions. Neutrophils are phagocytic cells.

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

- 04** Which of the following gastric cells indirectly help in erythropoiesis? **[NEET 2018]**

- (a) Goblet cells
- (b) Mucous cells
- (c) Chief cells
- (d) Parietal cells

Ans. (d)

Parietal cells (oxyntic cells) secrete hydrochloric acid and castle intrinsic factor. HCl converts iron (in diet) from ferric to ferrous form which can be easily absorbed and used during erythropoiesis (formation of RBCs).

Castle intrinsic factor helps in absorbing vitamin-B₁₂ and its deficiency causes pernicious anaemia. The functions of other cells are as follows

Mucous or Goblet cells secrete mucus that lines the stomach and protects it from the acid present in stomach.

Chief cells secrete gastric digestive enzymes as proenzymes or zymogens.

- 05** Match the items given in Column I with those in Column II and select the correct option given below

[NEET 2018]

Column I	Column II
1. Fibrinogen	(i) Osmotic balance
2. Globulin	(ii) Blood clotting
3. Albumin	(iii) Defence mechanism

- | | | | |
|-----|-------|-------|-------|
| | 1 | 2 | 3 |
| (a) | (i) | (iii) | (ii) |
| (b) | (i) | (ii) | (iii) |
| (c) | (iii) | (ii) | (i) |
| (d) | (ii) | (iii) | (i) |

Ans. (d)

Fibrinogen is a soluble plasma protein that is stimulated by thrombin and gets converted into insoluble form fibrin. The latter helps in the formation of blood clot to seal the wound and stop bleeding.

Globulins are simple proteins that form a large fraction of blood serum proteins involved in defence mechanism. There are four main types of globulins that are manufactured in liver, namely alpha-1, alpha-2, beta and gamma.

Albumin is a plasma protein that is manufactured by the liver. It helps in maintaining osmotic pressure which prevents the fluid-leakage out into the tissues from the bloodstream.

- 06** Adult human RBCs are enucleate. Which of the following statement(s) is/are most appropriate explanation for this feature?

- (I) They do not need to reproduce.
[NEET 2017]
(II) They are somatic cells.
(III) They do not metabolise.
(IV) All their internal space is available for oxygen transport.

Codes

- (a) Only (IV)
(b) Only (I)
(c) (I), (III) and (IV)
(d) (II) and (III)

Ans. (a)

The absence of nucleus in RBC is an adaptation that allows it to contain more haemoglobin and carry more oxygen by providing empty space. This adaptation also aids in effective diffusion of oxygen.

Concept Enhancer RBCs are initially produced in bone marrow with a nucleus. They, then undergo enucleation at maturity, in which their nucleus is removed.

- 07** Name the blood cells, whose reduction in number can cause clotting disorder, leading to excessive loss of blood from the body.
[NEET 2016, Phase II]

- (a) Erythrocytes (b) Leucocytes
(c) Neutrophils (d) Thrombocytes

Ans. (d)

A reduction in number of thrombocytes can lead to clotting disorders which will result in excessive loss of blood from the body. These are also called blood platelets.

- 08** Serum differs from blood in
[NEET 2016, Phase II]

- (a) lacking globulins
(b) lacking albumins
(c) lacking clotting factors
(d) lacking antibodies

Ans. (c)

When all clotting factors along with cells are removed from plasma, it becomes serum.

- 09** Person with blood group AB is considered as universal recipient because he has [CBSE AIPMT 2014]

- (a) Both A and B antigens on RBC but no antibodies in the plasma
(b) Both A and B antibodies in the plasma
(c) No antigen on RBC and no antibody in the plasma
(d) Both A and B antigens in the plasma but no antibodies

Ans. (a)

Blood group AB is universal recipient because the person with AB blood group has both A and B antigens on RBC but no antibodies in the plasma. Other blood group and their genotypes are given below

Blood group	Antigen (s) Present on the RBC	Antibodies Present in Serum	Genotypes
A	Antigen-A	Anti-b	AA/AO
B	Antigen-B	Anti-a	BB/BO
O	None	Anti-a and b	O

- 10** A certain road accident patient with unknown blood group needs immediate blood transfusion. His one doctor friend at once offers his blood. What was the blood group of the donor?
[CBSE AIPMT 2012]

- (a) Blood group B (b) Blood group AB
(c) Blood group O (d) Blood group A

Ans. (c)

Blood group is tested by two types of sera, i.e. anti-A (antibody-A) and anti-B (antibody-B). Persons with blood group O possess both antibodies in their plasma but have no antigens in their RBCs. So, RBCs of blood group 'O' do not show clumping in any of the two sera. That's why, persons with blood group 'O' are called universal donor and they can donate blood to a person with any type of blood group.

- 11** Which one of the following plasma proteins is involved in the coagulation of blood?
[CBSE AIPMT 2011]

- (a) Serum amylase (b) A globulin
(c) Fibrinogen (d) An albumin

Ans. (c)

Fibrinogen (factor 1) is a soluble plasma glycoprotein, synthesised by the liver. It is converted by thrombin into fibrin during blood coagulation. Fibrin is then cross-linked by factor XIII to form a clot.

- 12** A person with unknown blood group under ABO system, has suffered much blood loss in an accident and needs immediate blood transfusion. His one friend who has a valid certificate of his own blood type, offers for blood donation without delay. What would have been the type of blood group of the donor friend?
[CBSE AIPMT 2011]

- (a) Type AB (b) Type O
(c) Type A (d) Type B

Ans. (b)

Blood type 'O' has no antigen but both types of antibodies 'a' and 'b'. The person with blood type 'O' is universal donor.

- 13** The most popularly known blood grouping is the ABO grouping. It is named ABO and not ABC because 'O' in it refers to having
[CBSE AIPMT 2009]

- (a) other antigens besides A and B on RBCs
(b) over dominance of this type on the genes for A and B types
(c) one antibody only—either anti-A or anti-B on the RBCs
(d) no antigens A and B on RBCs

Ans. (d)

Landsteiner divided human population into four groups based on the presence of antigens found in their RBCs. Each group represented a blood group. Thus, there are four types of blood groups A, B, AB and O. Blood group 'O' does not contain any antigen on RBCs, hence can be given to any person, that's why this blood group is called universal donor.

- 14** If you suspect major deficiency of antibodies in a person, to which of the following would you look for confirmatory evidence?
[CBSE AIPMT 2007]

- (a) Serum albumins
(b) Serum globulins
(c) Fibrinogen in the plasma
(d) Haemocytes

Ans. (b)

Deficiency of antibodies can be confirmed by serum globulins as antibodies are also called immunoglobulins and constitute the gamma globulin part of blood proteins. These are secreted by activated B-cells or plasma cells.

- 15** A drop of each of the following, is placed separately on four slides. Which of them will not coagulate? [CBSE AIPMT 2007]

- (a) Blood plasma
- (b) Blood serum
- (c) Sample from the thoracic duct of lymphatic system
- (d) Whole blood from pulmonary vein

Ans. (b)

Serum will not coagulate. Because serum do not contain clotting factor, RBCs or WBCs. It is blood plasma not including the fibrinogens.

- 16** Examination of blood of a person suspected of having anaemia, shows large, immature, nucleated erythrocytes without haemoglobin. Supplementing his diet with which of the following, is likely to alleviate his symptoms? [CBSE AIPMT 2006]

- (a) Thiamine
- (b) Folic acid and cobalamin
- (c) Riboflavin
- (d) Iron compounds

Ans. (d)

Anaemia refers to any condition in which there is an abnormally low haemoglobin concentration and/or blood cell count. The most common cause is deficiency of iron which is an essential element of haemoglobin molecule. Thus, the iron compounds in the diet will help to alleviate the symptoms of anaemia.

- 17** Antibodies in our body are complex [CBSE AIPMT 2006]

- (a) lipoproteins
- (b) steroids
- (c) prostaglandins
- (d) glycoproteins

Ans. (d)

Antibodies are the proteins (glycoproteins) called immunoglobulins. These are produced by B-lymphocytes in response to entry of a foreign substance or antigen into the body. Lipoproteins are the micellar complex of protein and lipids.

Steroids are a group of lipids derived from a saturated compound cyclopentano perhydrophenanthrene which has a nucleus of four rings.

Prostaglandin is a group of organic compounds derived from essential fatty acids and causing a range of physiological effects in animals.

- 18** Which of the following substances, if introduced in the blood stream, would cause coagulation, at the site of its introduction? [CBSE AIPMT 2005]

- (a) Fibrinogen
- (b) Prothrombin
- (c) Heparin
- (d) Thromboplastin

Ans. (d)

Lipoproteinaceous, thromboplastin is released by the injured tissue which causes blood clotting. In blood vessels, thromboplastin do not release due to which blood does not clot.

But external thromboplastin to blood will cause blood clotting at the site of its introduction due to the formation of prothrombinase.

- 19** You are required to draw blood from a patient and to keep it in a test tube for analysis of blood corpuscles and plasma. You are also provided with the following four types of test tubes. Which of them will you not use for the purpose? [CBSE AIPMT 2004]

- (a) Test-tube containing calcium bicarbonate
- (b) Chilled test tube
- (c) Test tube containing heparin
- (d) Test tube containing sodium oxalate

Ans. (a)

Clotting of collected blood can be prevented by coating the test tubes with silicon or adding chelating agents. Citrate, oxalate, heparin and EDTA are anticoagulants.

- 20** What is correct regarding leucocytes? [CBSE AIPMT 2000]

- (a) These can squeeze out through (can cross) the capillary walls
- (b) These are enucleate
- (c) Sudden fall in their number indicates cancer
- (d) These are produced in thymus

Ans. (a)

Most of the T and B-lymphocytes (types of leukocytes) continuously circulate between the blood and lymph. These leave the blood stream, squeezing out between specialised endothelial cuts found in certain small vessels and enter various tissues including all the lymph nodes.

After percolating through a tissue, these accumulate in small lymphatic vessels which connect to a series of lymph nodes, from where they ultimately enter the main lymphatic vessel (thoracic duct) which carries them back into the blood.

- 21** What is correct for blood group 'O'? [CBSE AIPMT 2001, 1999]

- (a) No antigens but both a and b antibodies are present
- (b) A antigen and b antibody
- (c) Antigen and antibody both absent
- (d) A, B antigens and a, b antibodies

Ans. (a)

In blood of 'O' group, no antigens are present on red blood cells, but both anti-a and anti-b antibodies are present in plasma. Blood group A has antigen 'A' and antibody 'b'.

Blood group B has antigen 'B' and antibody 'a'. Blood group AB has antigens 'A' and 'B' but no antibody in plasma.

- 22** Haemoglobin is a type of [CBSE AIPMT 1999]

- (a) carbohydrate
- (b) vitamin
- (c) skin pigment
- (d) respiratory pigment

Ans. (d)

Haemoglobin (Hb) is a proteinaceous respiratory pigment made up of a protein called globin with iron [Fe^{2+}] containing porphyrin as prosthetic group. It binds to oxygen reversibly.

- 23** Which is the principal cation in the plasma of the blood? [CBSE AIPMT 1999]

- (a) Magnesium
- (b) Sodium
- (c) Potassium
- (d) Calcium

Ans. (b)

The concentration of Na^+ in plasma is 0.32% followed by K^+ (0.02%) and magnesium (0.0025%).

The mineral ions like Na^+ and others present in the blood plasma play an essential role in the maintenance of osmotic pressure of the blood.

- 24** Which of the following is agranulocyte? [CBSE AIPMT 1997]
 (a) Lymphocyte (b) Eosinophil
 (c) Basophil (d) Neutrophil

Ans. (a)

White Blood Corpuscles (WBC) or leucocytes can be divided into two groups on the presence/absence of minute granules in the cytoplasm.

- (a) Granulocytes which contain granules. e.g. neutrophils, eosinophils and basophils.
 (b) Agranulocytes which do not contain granules. lymphocytes, monocytes.

- 25** The life span of human WBC is approximately [CBSE AIPMT 1997]
 (a) less than 10 days
 (b) between 20-30 days
 (c) between 2-3 months
 (d) more than 4 months

Ans. (a)

Human WBC (or leukocytes) life span is approximately less than 10 days. Leukocytes constitute less than 1% of the cells in human blood. They are large in size than red blood cells. They have nucleus but no haemoglobin.

- 26** Which one of the following vertebrate organs receives the oxygenated blood only? [CBSE AIPMT 1996]
 (a) Gill (b) Lung
 (c) Liver (d) Spleen

Ans. (d)

Only spleen and brain always receive oxygenated blood. Gills and lungs are the blood purifying organs, i.e. here blood becomes oxygenated and these two organs always receive deoxygenated blood. Liver is a part of hepatic portal system, in which hepatic portal vein carries food laden blood from alimentary canal and associated glands before finally returning to heart.

- 27** Antigens are present [CBSE AIPMT 1995]
 (a) inside the nucleus
 (b) on cell surface
 (c) inside the cytoplasm
 (d) on nuclear membrane

Ans. (b)

Antigens (Ag) are foreign particles present on the surface of cell and when introduced in the blood they initiate a specific immune response against themselves.

- 28** Cells formed in bone marrow include [CBSE AIPMT 1993]
 (a) RBC
 (b) RBC and leucocytes
 (c) leucocytes
 (d) lymphocytes

Ans. (b)

In the developing foetus, the haemopoietic tissues are liver and spleen, while after birth RBCs are mainly produced in the bone marrow of the long bones. The formation of leucocytes occurs in the bone marrow, Peyer's patches, lymph nodes, thymus, spleen etc. and it is called as leucopoiesis.

- 29** Removal of calcium from freshly collected blood would [CBSE AIPMT 1989]
 (a) cause delayed clotting
 (b) prevent clotting
 (c) cause immediate clotting
 (d) prevent destruction of haemoglobin

Ans. (b)

Blood clotting starts when prothrombinase in the presence of Ca^{2+} converts inactive prothrombin into thrombin which in turn converts dissolved fibrinogen protein into fine thread-like fibrin. The network of fibrin covers the wound in which blood corpuscles get entangled and form clot. If Ca^{2+} is removed, it will prevent clotting.

- 30** In the ABO system of blood groups, if both antigens are present but no antibody, the blood group of the individual would be [CBSE AIPMT 2004, 1991]
 (a) B (b) O (c) AB (d) A

Ans. (c)

Blood groups	Antigen on RBC	Antibodies in serum
A	A	anti-b
B	B	anti-a
AB	A and B	-
O	-	anti-a and anti-b

Hence, blood group AB has no antibodies in serum but both antigens A and B.

- 31** A person with blood group A requires blood. The blood group which can be given is [CBSE AIPMT 1989]
 (a) A and B (b) A and AB
 (c) A and O (d) A, B, AB and O

Ans. (c)

Blood group A has A antigen and b antibody and blood group O has no antigens and both a and b antibodies so, if a patient with blood group A needs blood, both A and O blood group can be given to him.

- 32** Which one engulfs pathogens rapidly? [CBSE AIPMT 1989]
 (a) Acidophils (b) Monocytes
 (c) Basophils (d) Neutrophils

Ans. (d)

Neutrophils are granulocytes, i.e., cytoplasm is filled with fine granules. These granules are actually lysosome and Golgi bodies. These are the chief phagocytic cells of the body and engulf the microbes by phagocytosis, so neutrophils are also called soldiers of the body.

- 33** Child death may occur in the marriage of [CBSE AIPMT 1988, 2000]
 (a) Rh^+ man and Rh^+ woman
 (b) Rh^+ man and Rh^- woman
 (c) Rh^- man and Rh^- woman
 (d) Rh^- man and Rh^+ woman

Ans. (b)

Rhesus antibodies are formed in the plasma of Rh^- woman who have been pregnant with Rh^+ babies, if the foetal blood leaks across the placenta during the birth the mother body starts preparing antibodies against the Rh-antigen. Later Rh^+ foetus would be at risk and may suffer from haemolysis.

- 34** RBCs do not occur in [CBSE AIPMT 1988]
 (a) frog (b) cow
 (c) camel (d) cockroach

Ans. (d)

RBCs or red blood corpuscles are meant for the transportation of respiratory gases in the blood and these are present in all vertebrates.

In cockroach haemolymph is present which serves for the transportation of nutrients, maintains hydrostatic pressure and acts as a reservoir of water.

- 35** Breakdown product of haemoglobin is [CBSE AIPMT 1988]
 (a) bilirubin (b) iron
 (c) biliverdin (d) calcium

Ans. (a)

Haemoglobin of erythrocytes split off into heme and globin. The core of iron in heme is salvaged, bound to protein as hemosiderin and stored for reuse.

The remaining of the heme group is degraded to bilirubin a yellow pigment that is released into the blood. Bilirubin is picked up by liver cells which in turn secrete it into the intestine where it is metabolised to urobilinogen.

- 36** One of the factors required for the maturation of erythrocytes is
[CBSE AIPMT 1998]

- (a) vitamin-D
- (b) vitamin-A
- (c) vitamin-B₁₂
- (d) vitamin-C

Ans. (c)

Vitamin-B₁₂ (cobalamin) promotes DNA synthesis, maturation of erythrocytes and myelin formation. Vitamin-D (calciferol), It is necessary for the formation of healthy bones and teeth.

Vitamin-A (retinol), It is necessary for proper body growth and night vision. Vitamin-C (ascorbic acid), It helps in wound healing, blood formation and absorption of iron.

- 37** The haemorrhagic disease of new born is caused due to the deficiency of
[CBSE AIPMT 1995]

- (a) vitamin-A
- (b) vitamin-B₁
- (c) vitamin-B₁₂
- (d) vitamin-K

Ans. (d)

The haemorrhagic disease of new born is caused due to the deficiency of vitamin-K, characterised by delayed blood clotting and haemorrhage (blood loss).

- 38** Vitamin-K is required for
[CBSE AIPMT 1993]

- (a) formation of thromboplastin
- (b) conversion of fibrinogen to fibrin
- (c) conversion of prothrombin to thrombin
- (d) synthesis of prothrombin

Ans. (d)

Vitamin-K (phyloquinone) is required for the synthesis of prothrombin necessary for blood clotting. It is synthesised by bacteria in the colon. Vitamin-K is commonly called anti-haemorrhagic vitamin. Its deficiency leads to bleeding, i.e. no coagulation or clotting.

TOPIC 2

Structure of the Human Circulatory System: Heart

- 39** The QRS complex in a standard ECG represents [NEET (Sep.) 2020]

- (a) depolarisation of auricles
- (b) depolarisation of ventricles
- (c) repolarisation of ventricles
- (d) repolarisation of auricles

Ans. (b)

Option (b) is correct and can be explained as in an ECG there occurs five consecutive waves: P, Q, R, S and T.

P wave represents depolarisation of atria and leads to contraction of both atria.

QRS complex represents depolarisation of ventricles which leads to initiation of ventricular contraction.

T wave represents return of ventricles from excited to normal state.

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

- (a) SA node has the lowest rate of depolarisation
- (b) SA node is the only component to generate the threshold potential
- (c) Only SA node can convey the action potential to the other components
- (d) SA node has the highest rate of depolarisation

Ans (d)

The nodal musculature has the ability to generate action potentials without any external stimuli, i.e. it is autoexcitable. However, the number of action potentials that could be generated in a minute vary at different parts of the nodal system.

The SAN (Sino-Atrial Node) can generate the maximum number of action potentials, i.e. 70-75 min, i.e. the highest rate of depolarisation and is responsible for initiating and maintaining the rhythmic contractile activity of the heart. Therefore, it is called pacemaker.

- 41** 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 (Odisha) 2019]

- (a) blood to enter aorta
- (b) the ventricles to empty completely
- (c) blood to enter pulmonary arteries
- (d) the atria to empty completely

Ans. (d)

Atrio-Ventricular Node (AVN) present in the lower corner of the right atrium, delays the spreading of impulses to heart ventricles for about 0.1 second. This pause allows the atria to empty completely into the ventricles before the ventricles pump out the blood.

- 42** What would be the heart rate of a person if the cardiac output is 5 L, blood volume in the ventricles at the end of diastole is 100 mL and at the end of ventricular systole is 50 mL? [NEET (National) 2019]

- (a) 75 beats per minute
- (b) 100 beats per minute
- (c) 125 beats per minute
- (d) 50 beats per minute

Ans. (b)

As per the given data, the heart rate of the person would be 100 beats per minute. It can be calculated as follows Given, Cardiac output = 5L (5000 mL) Blood volume in ventricles at the end of diastole = 100 mL

Blood volume at the end of ventricular systole = 50 mL

So, Stroke volume = 100 – 50 = 50 mL
Cardiac output = Stroke volume × Heart rate, i.e.

5000 mL = 50 mL × Heart rate
Therefore, Heart rate = 100 beats/min.

43 Match the following columns.
[NEET (National) 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 of T-wave	(iv) Depolarisation of atria
	(v) Repolarisation of atria

Select the correct option.

A B C D

- (a) (iv) (i) (ii) (v)
 (b) (ii) (i) (v) (iii)
 (c) (ii) (iii) (v) (iv)
 (d) (iv) (i) (ii) (iii)

Ans. (d)

(A)-(iv), (B)-(i), (C)-(ii), (D)-(iii)

In an Electrocardiograph (ECG), P-wave represents the depolarisation of atria which is caused by the activation of SA node. QRS complex represents depolarisation of ventricles which is caused by the impulse of contraction from AV node.

T-wave represents repolarisation of ventricles and reduction in its size signifies coronary ischemic, i.e. when the heart muscles receive insufficient oxygen as in arteriosclerotic heart disease.

44 Match the items given in Column I with those in Column II and select the correct option given below
[NEET 2018]

Column I	Column II
1. Tricuspid valve	(i) Between left atrium and left ventricle
2. Bicuspid valve	(ii) Between right ventricle and pulmonary artery
3. Semilunar valve	(iii) Between right atrium and right ventricle

- 1 2 3
 (a) (i) (ii) (iii)
 (b) (i) (iii) (ii)
 (c) (iii) (i) (ii)
 (d) (ii) (i) (iii)

Ans. (c)

The atrioventricular opening between the left atrium and left ventricle is guarded by the **bicuspid valve**. It is also called as mitral valve. The right atrioventricular opening is guarded by the **tricuspid valve**. It has three flaps. **Semilunar valve** is found in right ventricle and pulmonary artery. Therefore, option (c) is correct.

45 Doctors use stethoscope to hear the sounds produced during each cardiac cycle. The second sound is heard when [CBSE AIPMT 2015]

- (a) AV valves open up
 (b) ventricular walls vibrate due to gushing in of blood from atria
 (c) semilunar valves close down after the blood flows into vessels from ventricles
 (d) AV node receives signal from SA node

Ans. (c)

In healthy adults, there are two normal heart sounds often described as lub and dup. These are the first heart sound and second heart sound produced by the closing of the AV valves and semilunar valves respectively.

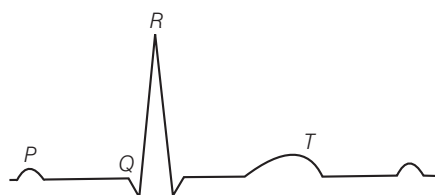
46 Which one of the following animals has two separate circulatory pathways? [CBSE AIPMT 2015]

- (a) Frog (b) Lizard
 (c) Whale (d) Shark

Ans. (c)

The circulatory system in which two distinct and separate circulatory pathways for blood flow are involved, is called double circulatory system (also, double-loop circulatory system). It occurs in mammals and birds. Whale is a mammal, so it shows above characteristic.

47 The diagram given here is the standard ECG of a normal person. The P-wave represents the [NEET, CBSE AIPMT 2013, 2009]



- (a) contraction of both the atria
 (b) initiation of the ventricular contraction
 (c) beginning of the systole
 (d) end of systole

Ans. (a)

In ECG, P-wave represents the depolarisation of atria which leads to the contraction of both atria. T-wave represents the return of ventricles from excited to normal state. The QRS complex represents the depolarisation of the ventricles which initiates ventricular contraction. The contraction starts shortly after Q and marks the beginning of systole.

48 'Bundle of His' is a part of which one of the following organs in humans? [CBSE AIPMT 2011]

- (a) Heart (b) Kidney
 (c) Pancreas (d) Brain

Ans. (a)

The bundle of His, are specialised muscle fibres for electrical conduction present in the heart which were named after the Swiss cardiologist Wilhelm His, Jr., who discovered them in 1893. These are also known as AV bundle which is a collection of heart muscle cells

49 If due to some injury the chordae tendinae of the tricuspid valve of the human heart is partially non-functional, what will be the immediate effect? [CBSE AIPMT 2010]

- (a) The flow of blood into the aorta will be slowed down
 (b) The 'pacemaker' will stop working
 (c) The blood will tend to flow back into the left atrium
 (d) The flow of blood into the pulmonary artery will be reduced

Ans. (d)

If chordae tendinae of the tricuspid valve became partially non-functional due to the injury then the flow of blood into the pulmonary artery will be reduced. Because chordae tendinae, arise from papillary muscles and insert upon the flaps of tricuspid and bicuspid valves and the valves in the heart allow the flow of blood only in one direction, i.e., from the atria to the ventricles and from the ventricles to the pulmonary artery or aorta.

- 50** In humans, blood passes from the post caval to the diastolic right atrium of heart due to

[CBSE AIPMT 2008]

- (a) pushing open of the venous valves
- (b) suction pull
- (c) stimulation of the sino auricular node
- (d) pressure difference between the post caval and atrium

Ans. (d)

Due to the pressure difference between the post caval and atrium, the blood passes from the post caval to the diastolic right atrium. Because the action of heart includes contractions and relaxations of the atria and ventricles. The dynamics of blood flow in blood vessels is no exception and blood flows through the blood vessels along a pressure gradient, always moving from higher to lower pressure areas.

- 51** Systemic heart refers to

[CBSE AIPMT 2003]

- (a) enteric heart in lower vertebrates
- (b) the two ventricles together in humans
- (c) the heart that contracts under stimulation from nervous system
- (d) left auricle and left ventricle in higher vertebrates

Ans. (a)

Systemic heart refers to enteric heart in lower vertebrates. It pumps the blood to different body parts and not to lungs.

- 52** Bundle of His is a network of

[CBSE AIPMT 2003]

- (a) nerve fibres distributed in ventricles
- (b) nerve fibres found throughout the heart
- (c) muscle fibres distributed throughout the heart walls
- (d) muscle fibres found only in the ventricle wall

Ans. (d)

Bundle of His is a network of specialised conducting muscle fibres (Purkinje fibres) which transmit the impulse from AV node to all parts of both the ventricles.

- 53** In mammals, histamine is secreted by

[CBSE AIPMT 1998]

- (a) fibroblasts
- (b) histocytes
- (c) lymphocytes
- (d) mast cells

Ans. (d)

Histamine is a potent vasodilator formed by decarboxylation of the amino acid histidine and released by mast cells in response to appropriate antigens.

Mast cells are especially prevalent in the connective tissue of the skin, respiratory tract and in surrounding blood vessels.

- 54** The correct route through which pulse-making impulse travels in the heart is

[CBSE AIPMT 1995]

- (a) AV node → Bundle of His → SA node → Purkinje fibres → Heart muscles
- (b) AV node → SA node → Purkinje fibres → Bundle of His → Heart muscles
- (c) SA node → Purkinje fibres → Bundle of His → AV node → Heart muscles
- (d) SA node → AV node → Bundle of His → Purkinje fibres → Heart muscles

Ans. (d)

The correct route through which pulse-making impulse travels in the heart is : SA node → AV node → Bundle of His → Purkinje fibres → Heart muscles.

- 55** Pacemaker of heart is

[CBSE AIPMT 1994, 99, 2002, 04]

- (a) AV node
- (b) bundle of His
- (c) SA node
- (d) Purkinje fibres

Ans. (c)

SA node lies in the right wall of right auricle below the opening of superior vena cava. It is also called pacemaker as it is first to originate the cardiac impulses and determines the rate of heartbeat.

- 56** Dup sound is produced during closure of

[CBSE AIPMT 1994]

- (a) semilunar valves
- (b) bicuspid valve
- (c) tricuspid valve
- (d) Both (b) and (c)

Ans. (a)

The period between the end of one heartbeat to the end of next heartbeat is called cardiac cycle. Cardiac cycle is formed of three phases.

Atrial systole, ventricular systole and joint diastole. During ventricular systole closing of Auriculo ventricular (AV) valves at the start of ventricular systole produces first heart sound called 'lubb' or systolic sound. During joint diastole rapid closure of semilunar valves at the beginning of ventricular diastole produces the second heart sound called 'dup'.

- 57** Tricuspid valve is found in between

[CBSE AIPMT 1989]

- (a) sinus venosus and right auricle
- (b) right auricle and right ventricle
- (c) left ventricle and left auricle
- (d) ventricle and aorta

Ans. (b)

Right auricle opens in right ventricle through a wide circular right auriculoventricular aperture guarded by right auriculoventricular valve which is formed of three flaps called cusps, so it is called tricuspid valve. It regulates the unidirectional flow of blood from right auricle to right ventricle.

TOPIC 3

Structure of Human Circulatory System Blood vessels

- 58** Blood pressure in the pulmonary artery is

[NEET 2016, Phase I]

- (a) more than that in the carotid
- (b) more than that in the pulmonary vein
- (c) less than that in the vena cava
- (d) same as that in the aorta

Ans. (b)

Blood pressure in different blood vessels : Artery > Arteriole > Capillary > Venule > Vein (vena cava). The pulmonary arteries have thicker smooth muscle and connective tissue than the pulmonary veins to accommodate the higher pressure and high rate of blood flow.

- 59** In mammals, which blood vessel would normally carry largest amount of urea?

[NEET 2016, Phase I]

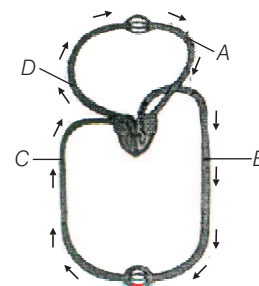
- (a) Dorsal Aorta
- (b) Hepatic Vein
- (c) Hepatic Portal Vein
- (d) Renal Vein

Ans. (b)

Urea is synthesised in liver. So, maximum amount of urea is present in hepatic vein and minimum in renal vein.

- 60** Figure shows schematic plan of blood circulation in human with labels A-D. Identify the correct label with given function

[NEET 2013]



- (a) A-pulmonary vein-takes impure blood from body parts, $pO_2 = 60$ mm Hg
 (b) B-pulmonary artery takes blood from heart to lungs, $pO_2 = 90$ mm Hg
 (c) C-vena cava takes blood from body parts to right auricle, $pCO_2 = 45$ mm Hg
 (d) D-dorsal aorta takes blood from heart to body parts, $pO_2 = 95$ mm Hg

Ans. (c)

The correct labelling of parts with their respective functions is as follows.

A. Pulmonary vein	takes oxygenated blood from lung and carried it to left auricle.
B. Dorsal aorta	takes blood from heart to body parts, $pO_2 = 95$ mm Hg.
C. Vena cava	takes blood from body parts to right auricle $pCO_2 = 45$ mm Hg
D. Pulmonary artery	takes blood from heart to lungs, $pO_2 = 90$ mm Hg

61 Arteries are best defined as the vessels which [CBSE AIPMT 2011]

- (a) carry blood away from the heart to different organs
 (b) break up into capillaries which reunite to form a vein
 (c) carry blood from one visceral organ to another visceral organs
 (d) supply oxygenated blood to the different organs

Ans. (a)

Arteries are blood vessels that carry blood away from the heart towards different organs. They generally contain oxygenated blood (except pulmonary artery which contains deoxygenated blood). The blood flows in an artery under alternate increased pressure and with jerks.

62 Which one of the following statements is correct regarding blood pressure? [CBSE AIPMT 2011]

- (a) 100/55 mm Hg is considered an ideal blood pressure
 (b) 105/50 mm Hg makes one very active
 (c) 190/110 mm Hg may harm vital organs like brain and kidney
 (d) 130/90 mm Hg is considered high and requires treatment

Ans. (c)

Blood pressure [190/110 mm Hg] of an individual is 140/90 [140 over 90] or higher, it shows hypertension. High blood pressure [190/110 mm Hg] leads to heart

diseases and also affects vital organs like brain and kidney. Hypertension means the blood pressure that is higher than normal [120/80]. In this measurement, 120 mm Hg (millimeter of mercury pressure) is the normal systolic or pumping, pressure and 80 mm Hg is the normal diastolic or resting pressure.

63 Pulmonary artery is different from pulmonary vein because it has [CBSE AIPMT 2000]

- (a) larger lumen
 (b) thick muscular walls
 (c) no endothelium
 (d) valves

Ans. (b)

Arteries have thick walls, narrow lumen but no valves. Endothelium is present in both arteries and veins.

64 The thickening of walls of arteries is called [CBSE AIPMT 1999]

- (a) arthritis (b) atherosclerosis
 (c) aneurysm (d) Both (a) and (c)

Ans. (b)

Atherosclerosis involves thickening of inner walls of arteries due to deposition of lipid (cholesterol) which prevents the dilation of arteries.

65 An adult human with average health has systolic and diastolic pressures as [CBSE AIPMT 1998]

- (a) 80 mm Hg and 80 mm Hg
 (b) 70 mm Hg and 120 mm Hg
 (c) 120 mm Hg and 80 mm Hg
 (d) 50 mm Hg and 80 mm Hg

Ans. (c)

In a normal human being, the systolic and diastolic pressure are 120 mmHg and 80 mmHg respectively.

66 Closed circulatory system occurs in [CBSE AIPMT 1994]

- (a) cockroach (b) tadpole/fish
 (c) mosquito (d) house fly

Ans. (b)

Closed circulatory system is usually high pressure system, in which blood flows in closed tubular structures called blood vessels (arteries, veins and capillaries). It is found in most of annelids, cephalopods, among the molluscs and all vertebrates including human beings. In this type of system there is no direct contact between body tissues and blood. This is more efficient as blood circulation is completed in short period.

67 Wall of blood capillary is formed of [CBSE AIPMT 1993, 91]

- (a) haemocytes (b) parietal cells
 (c) endothelial cells (d) oxyntic cells

Ans. (c)

Each capillary is lined by a single layer of flat cells, called endothelium. The endothelium allows the exchange of materials like the nutrients, respiratory gases, waste products, hormones, etc between the blood and surrounding tissue cells through the tissue fluid.

68 Splenic artery arises from [CBSE AIPMT 1990]

- (a) anterior mesenteric artery
 (b) coeliac artery (or celiac artery)
 (c) posterior mesenteric artery
 (d) intestinal artery

Ans. (b)

Splenic artery is the blood vessel that supplies oxygenated blood to the spleen. It branches from the celiac artery and follows a course superior to the pancreas.

69 A vein possesses a large lumen because [CBSE AIPMT 1990]

- (a) tunica media and tunica externa form a single coat
 (b) tunica interna and tunica media form a single coat
 (c) tunica interna, tunica media and tunica externa are thin
 (d) tunica media is a thin coat

Ans. (d)

The tunica media is comparatively thin in the veins making a large lumen in veins. Basically each artery and vein consists of three layers, an inner lining of squamous endothelium, the tunica interna, a middle layer of smooth muscle and elastic fibre, the tunica media and an external layer of fibrous connective tissue with collagen fibres, the tunica externa.

70 Arteries carry oxygenated blood except [CBSE AIPMT 1989]

- (a) pulmonary
 (b) cardiac
 (c) hepatic
 (d) systemic

Ans. (a)

Right ventricle pumps deoxygenated blood into pulmonary artery which supplies it to the lungs where oxygenation of blood takes place.

TOPIC 4

Lymph and Lymphatic System

71 Which of the following statements is true for lymph?

[CBSE AIPMT 2002]

- (a) WBC and serum
- (b) All components of blood except RBCs and some proteins
- (c) RBCs, WBCs and plasma
- (d) RBCs, proteins and platelets

Ans. (b)

Lymph is known as blood minus RBCs and some proteins. The main site of lymph formation is interstitial space and normally the rate of lymph formation is equal to the rate of its return to blood stream.

72 Which of the following is not main function of lymph glands?

[CBSE AIPMT 1998]

- (a) Forming WBC
- (b) Forming antibodies
- (c) Forming RBC
- (d) Destroying bacteria

Ans. (c)

Cells of lymph nodes perform the following functions. (a) produce lymphocytes (b) synthesise antibodies (c) destroy bacteria by phagocytosis.

73 The lymph serves to

[CBSE AIPMT 1995]

- (a) transport oxygen to the brain
- (b) transport carbon dioxide to the lungs
- (c) return the interstitial fluid to the blood
- (d) return the WBCs and RBCs to the lymph nodes

Ans. (c)

Lymph acts as a middle man between the blood and tissue cells. Lymph is a transparent fluid derived from blood and other tissues which accumulates in the interstitial spaces as the interstitial fluid and it passes on food and O_2 from blood to tissue cells and handed ones excretory wastes, hormones and CO_2 from the body cells to the blood.

TOPIC 5

Disorders of Circulatory System

74 Which of the following conditions causes erythroblastosis foetalis?

[NEET (Oct.) 2020]

- (a) Mother Rh+ve and foetus Rh-ve
- (b) Mother Rh-ve and foetus Rh+ve
- (c) Both mother and foetus Rh-ve
- (d) Both mother and foetus Rh+ve

Ans. (b)

If mother is Rh-ve and foetus is Rh + ve then there can occur a condition called

erythroblastosis foetalis. It is a special case of Rh incompatibility in which during the second pregnancy of Rh – ve mother carrying Rh + ve foetus, the Rh antibodies from mother (Rh – ve) can leak into the blood of the foetus (Rh + ve) and destroy the foetal RBCs

75 Continuous bleeding from an injured part of body is due to deficiency of [CBSE AIPMT 2002]

- (a) vitamin-A
- (b) vitamin-B
- (c) vitamin-K
- (d) vitamin-E

Ans. (c)

Vitamin-K is required for clotting process, it is required for the formation of prothrombin in liver, the deficiency of which leads to severe bleeding disorders. Deficiency of vitamin-A causes night blindness, xerophthalmia, keratomalacia, retarded growth. Deficiency of vitamin-B causes beri-beri disease. Deficiency of vitamin-E causes sterility.

76 The blood cancer is known as

[CBSE AIPMT 1995]

- (a) leukemia
- (b) thrombosis
- (c) haemolysis
- (d) haemophilia

Ans. (a)

Blood cancer is known as leukemia which is characterised by uncontrolled division of leukocytes.