BODY FLUIDS AND CIRCULATION

BIOLOGY

Single Correct Answer Type

1. Which of the following blood vessels in the circulatory system of frog has more deoxygenated blood?
   a) Pulmonary artery
   b) Precaval veins
   c) Pulmocutaneous artery
   d) Pulmocutaneous vein
2. Which one indicates hypertension or high blood pressure (BP)
   a) 120/80 b) 110/70 c) 130/80 d) 140/90
3. Identify the correct statement
   I. The impulse of the heart beat originates from SAN
   II. Rate of the heart is determined by SAN
   III. Bundle of His/AV bundle is present in the interventricular septum
   IV. Atrio Ventricular Node (AVN) is situated in the lower left corner of the right auricle
   Choose the correct option
   a) All except II b) All except I c) All except III d) All of these
4. Choose the correct pathway on the transmission of impulse in the heart beat.
   a) AV-node → SA-node → Bundle of His → Purkinje fibres
   b) SA-node → AV-node → Bundle of His → Purkinje fibres
   c) SA-node → Bundle of His → AV-node → Purkinje fibres
   d) AV-node → Bundle of His → SA-node → Purkinje fibres
5. Water circulatory system in found in
   I. *Sponge* II. *Hydra*
   III. Annelida IV. Starfish
   V. Arthropoda
   Choose the correct option
   a) I, II and III b) III, IV and V c) I, II and IV d) II, IV and V
6. Which of the following is an example of buffer system in blood?
   a) Haemoglobin and oxyhaemoglobin
   b) Oxygen and carbon dioxide
   c) Albumin and globulin
   d) Sodium bicarbonate and carbonic acid
7. In an open circulatory system,
   a) There is no distinction between the blood and the tissue fluid
   b) Of tissue fluid is absent
   c) No need of blood vessels
   d) Open space or sinuses are absent
8. Primary blood cells are formed in
   a) Plasma b) Bone marrow c) Liver d) Spleen
9. Properties of leucocytes are
   I. they are nucleated
   II. they are denucleated like RBC
   III. they are 6000-8000 mm^{-3} of blood
   IV. they are long lived
   V. they are short lived
   Choose the appropriate option with correct properties
   a) I, III and V b) II, IV and V c) I, IV and V d) I, III and V
10. SAN can generate impulses
    a) 70 – 75 min^{-1} b) 50 – 55 min^{-1} c) 100 – 150 min^{-1} d) 35– 40 min^{-1}

11. Haematuria means
    a) RBCs in the urine b) WBCs in the urine c) Both (a) and (b) d) None of these
12. An oval depression called fossa ovalis, is seen on
    a) Inter-atrial septum b) Inter-ventricular septum
    c) Right-auriculo-ventricular septum d) Left auriculo-ventricular septum
13. Which of the following acts as 'middle man of the body'?
    a) Plasma b) Lymph c) RBCs d) RBCs
14. Coronary heart disease is due to
    a) *Streptococci* bacteria b) Inflammation of pericardium
    c) Weakening of the heart valves d) Insufficient blood supply to the heart muscles
15. Pulse beat is measured from
    a) Arteries b) Veins c) Capillaries d) Nerves
16. Which of the following is incorrect?
    a) Heart is endodermal in origin
    b) Human heart is situated in the between the two lungs slightly tilted to left
    c) Heart is a double walled membranous bag
    d) Human heart has two atria and two ventricles
17. Lymphatic system is an elaborated network of vessels which collect the
    a) Interstitial fluid b) Intrastitial fluid c) Plasma fluid d) Protein fluid
18. In human heart, identify the correct statements a
    I. Volume of both the atria is the greater than the volume and both ventricles
    II. Volume of both the ventricle is greater than the volume of both the atria
    III. Inter-ventricular septum separates the right and the left atria
    IV. Atrio ventricular septum don't separates the atrium and ventricle
    Choose the correct option accordingly
    a) All except I b) All except II c) All except III d) All except IV
19. SAN generates an action potential which stimulates both the …A… to undergo a simultaneous contraction called …B… . This increases the flow of the blood into the ventricles by about …C… percentage
    Choose the correct option for A, B and C
    a) A-atria, B-asterial systole, C-30 b) A-ventricle, B-asterial systole, C-30
    c) A-atria, B-ventricular diastole, C-30 d) A-atria, B-asterial diastole, C-30
20. The normal percentage of glucose in the blood of man is 0.1%. it is found in
    a) Plasma b) RBCs c) WBCs d) Serum
21. Systemic heart refers to
    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
22. Which of the following can be considered as the blood bank of human body?
    a) Spleen b) Heart c) Liver d) Lungs
23. Coagulation of blood in blood vessels in living body is prevented by
    a) Prothrombin b) Heparin
    c) Prothrombin and calcium together d) Plasminogen and calcium together
24. Characteristic of open circulatory system
    I. Blood flows in the open tissue space, the sinuses
    II. Blood is in direct contact with the tissues cells
    III. Blood flow is slow
    IV. Blood pressure is high
    Choose the option with characteristics
    a) All except II b) All except I c) All except III d) All except IV
25. In a healthy adult man the normal diastolic pressure is

a) 90 mm Hg b) 120 mm Hg c) 80 mm Hg d) 100 mm Hg

26. Which of the following carries glucose from digestive tract to liver?
a) Hepatic artery b) Hepatic portal vein c) Pulmonary vein d) None of these

27. When the balloon of nitre-aortic balloon pump inflates, more blood is carried to
a) Coronary artery b) Pulmonary trunk c) Hepatic portal d) Pulmonary arteries

28. Clotting disorders occur mainly due to the reduction in the number of
a) Granulocytes b) RBC c) WBC d) Platelets

29. Which one of the following is a matching pair of a certain body feature and its value/count in a normal human adult?
a) Urea - 5 – 10 mg/100 mL of blood
b) Blood sugar (fasting) - 70 – 100 mg/100 mL
c) Total blood volume - 5 – 6
d) ESR in Wintrobe - 9 – 15 mm in males and 20 – 34 mm in females

30. Which of the following are erythropoietic organs?
I. liver
II. lymph node
III. spleen
IV. white bone marrow
V. red bone marrow
Choose the correct option
a) All except I b) All except II c) All except I d) All except IV

31. Prothrombin is
a) Formed in liver b) Formed by vitamins
c) Changed to thrombin by prothrominase d) All of the above

32. Spiral valve is present in
a) Right auricle b) Sinus venosus c) Right ventricle d) Truncus arteriosus

33. Choose the correct statements regarding the human blood
I. The volume of the blood in an adult is 5 L
II. It constitutes 30-35% of the total extracellular fluid
III. Glucose concentration in the blood is 50mg/100 mL
IV. Cholesterol concentration in the blood is 30 mg/100 mL
V. Urea level in the blood is 10 mg/100 mL
The option with correct statements is
a) I, II and III b) III, IV and V c) IV and V d) I and II

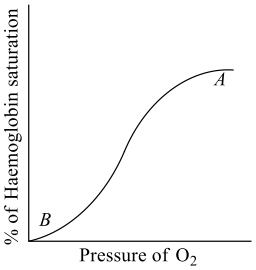
34. A doctor suggested not to have more than one child to a couple because
a) Male is Rh^+ and female is Rh^- b) Male is Rh^- and female is Rh^+
c) Male is Rh^- and female is Rh^- d) Male is Rh^+ and female is Rh^-

35. Leucocytes are colourless due to
a) Lack of water b) Lack of haemoglobin
c) Presence of extra water d) Presence of haemoglobin

36. When two atria contract simultaneously and results in the blood pumping into ventricles, this is called
a) Arterial diastole b) Arterial systole c) Ventricular diastole d) Ventricular systole

37. In haemoglobin, which amino acid acts as blood buffer?
a) Histidine b) Glutamine c) Aspartic d) Lysine

38. Identify *A* and *B* in the given graph and choose the correct option accordingly



a) A-Lungs; B-Liver b) A-Lungs; B-Tissue c) A-Tissue; B-Lungs d) A-Kidney; B-Liver

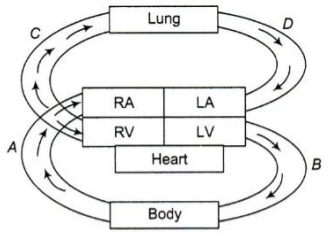
39. Double circulation is
    a) Passage of blood twice in heart through the same way
    b) Passage of blood twice in heart through the unique way
    c) Passage of blood twice in heart through the separate way
    d) None of the above
40. Atrial diastole takes place when
    a) Right atrium is filled with blood
    b) Left atrium is filled with blood
    c) Both atriums are filled with blood
    d) Both ventricles are filled with blood
41. Find out the wrong match
    a) Eosinophils – Allergic response
    b) Basophils – Secrete histamine and serotonin
    c) Neutrophils – Phagocytic and destroy foreign organisms
    d) Monocytes – Secrete heparin
42. Select the lymphoid organs from the given choices
    I. Lymph node II. Thymus gland
    III. Red bone marrow IV. liver
    V. Spleen VI. Osteocytes
    VII. Peyer's patches
    The correct option with correct choices is
    a) I, II, III and IV b) III, IV, V and VI c) IV, V, VI and VII d) I, II, IV, V and VII
43. Exchange of gases, nutrient, etc., between the blood and the cells takes place through
    a) RBC b) WBC c) Interstitial fluid d) Intrastitial fluid
44. Formed elements present in the human blood are
    I. erythrocytes II. leucocytes
    III. platelets IV. plasma
    V. plasma
    Chooses the correct option
    a) I, II and III b) II, III and IV c) III, IV and V d) I, II, III, IV and V
45. The opening of auricles and ventricles on the right side is guarded by
    a) Tricuspid valve b) Bicuspid valve c) Semilunar valve d) Eustachian tube
46. In humans, RBCs are formed in
    a) Red bone marrow
    b) Heart
    c) Lungs
    d) Yellow bone marrow
47. In frog's heart, there are cardiac muscles, which consists of fibres called
    a) Purkinje fibres b) Myonemes c) Telodendria d) Columnae carnae
48. Bicuspid valves are found in between
    a) Right ventricle and right auricle
    b) Right ventricle and left auricle
    c) Left ventricle and left auricle
    d) Right ventricle and left auricle
49. Among the following stem cells, which are found in the umbilical cord?
    a) Embryonic stem cells
    b) Adult stem cells
    c) Cord blood stem cells
    d) All of these
50. Congestion of the lungs is one of the main symptoms in
    a) Hypotension
    b) Coronary artery disease

c) Angina d) Heart failure

51. ECG is a graphical representation of the electric activity of the heart during
    a) Cardiac systole b) Cardiac diastole
    c) Cardiac cycle d) Ventricular and atrial diastole
52. Which is correct for artery?
    a) Thick-walled in which blood flows at high pressure
    b) Thin-walled and blood flow with low pressure
    c) Thick-walled and blood flow with low pressure
    d) None of the above
53. Human blood consists of
    a) Fluid matrix b) Plasma c) Formed elements d) All of the above
54. Identify wheather the given statements are true or false for double circulation
    I. It checks the mixing of oxygenated and deoxygenated blood
    II. It carries only oxygenated blood
    Choose the correct option accordingly
    a) I-False, II-False b) I-True, II-True c) II-False, True d) II-True, False
55. I. Neutrophils II. Eosinophils
    III. Basophils IV. Lymphocytes
    V. Monocytes
    Identify wheather the given cell types are granulocytes (A) and agranulocytes (B) and choose the correct option accordingly

	A	B
a)	I,II,III	IV,V
b)	I,III,IV	II,V
c)	IV,V	I,II,III
d)	II,V	I,III,IV

56. To obtain a standard ECG, the patient is connected to the machine with three electrical leads. These three electrical lead are connected as one each to the
    a) Biceps and third one at the ankle b) Triceps and third one at the ankle
    c) Thigh and third one at the ankle d) Wrist and third one at the ankle
57. Properties of human RBCs are
    I. devoid of nucleus
    II. formed in bone marrow
    III. possess healing properties
    IV. biconcave in shape
    V. help in blood clotting
    Choose the option with correct properties
    a) I, II and III b) I, II and IV c) III, IV and V d) III, II and IV
58. Erythrocytes of adult rabbit and other mammals are formed in
    a) Liver b) Spleen c) Kidney d) Red bone marrow
59. In given diagram which one is vena cava?



    a) A b) B c) C d) D
60. The following are the branches of dorsal aorta
    I. Intercostal
    II. Phrenic
    III. Coeliac

IV. Anterior mesenteric
V. Posterior mesenteric
Of these which set of arteries supply the blood to the glands of digestive system?
a) I and II b) III and IV c) IV and V d) II and III

61. Heart beat increases by
a) Adrenal hormones b) Sympathetic nerves
c) Both (a) and (b) d) Parasympathetic nerve

62. Which of the following statement (s) is/are incorrect?
I. The AV node and the bundle of His constitute, the electrical link between the atria and the ventricles
II. The bundle of His is a bundle of electrical nodes which allows the ventricles to contract
III. The bundle of His is a group of fibres that carry the electrical impulses through the centre of the heart
IV. The bundle of His is located in the artrial region
Choose the correct option
a) II, III and IV b) I, III and IV c) I, II and IV d) I, II and III

63. When thromboplastin is released in humans?
a) During hypertension b) By the traumatised cell at the place of injury
c) In the condition of erythroblastosis foetalis d) During anaemia

64. Blood pressure is controlled by
a) Adrenal b) Thyroid c) Thymus d) Corpus luteum

65. Atherosclerosis is called
a) Coronary artery disease b) Angina
c) Heart failure d) Hypertension

66. Haemoglobin is
a) An oxygen carrier in human blood b) A protein used as food supplement
c) An oxygen scavenger in root nodules d) A plant protein with high lysine content

67. In a healthy adult man, the normal diastolic pressure is
a) 90 mm Hg b) 120 mm Hg c) 80 mm Hg d) 100 mm Hg

68. You are required to draw blood from 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?
a) Test tube containing calcium bicarbonate b) Chilled test tube
c) Test tube containing heparin d) Test tube containing sodium oxalate

69. During ventricular systole
a) Oxygenated blood is pumped into the pulmonary artery and deoxygenated blood is pumped into the artery
b) Oxygenated blood is pumped into the aorta and deoxygenated blood is pumped into the pulmonary vein
c) Oxygenated blood is pumped into the pulmonary vein and deoxygenated blood is pumped into the pulmonary artery
d) Oxygenated blood is pumped into the aorta and deoxygenated blood is pumped into the pulmonary artery

70. Pacemaker in heart is situated
a) In the wall of left atrium b) In the wall of right atrium
c) On inter-auricular septum d) On inter-ventricular septum

71. Duration of cardiac cycle (≅· 88 s)
I. Atrial systole → …A… sec.
II. Atrial diastole → …B… sec.
III. Ventricular systole → …C… sec.
IV. Ventricular diastole → …D… sec.
Total time = ≅ · 88 sec
Choose the correct option for A, B, C and D
a) A-0.32, B-0.30, C-0.08, D-0.18

b) A-0.32, B-0.08, C-0.30, D-0.18
c) A-0.18, B-0.08, C-0.30, D-0.32
d) A-0.18, B-0.30, C-0.08, D-0.32

72.

Blood group	Antigen on RBCs	Antibody in Plasma	Donor's Group
A	A	Anti b	A, O
B	B	Anti A	B, O
AB	X	Nil	Z
O	Nil	Y	O

Choose the correct option for X, Y and Z

a) X-B; Y-A; Z-AB
b) X-AB; Y-Nil; Z-AB, ABO
c) X-AB; Y-anti-AB; Z-AB, ABO
d) X-AB; Y-anti AB; Z-AB, AB

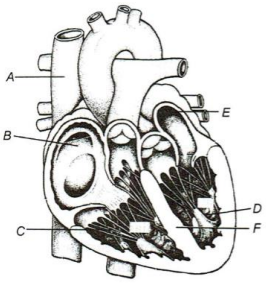
73. As the blood passes through the capillaries some water along with small water soluble substances move out into the spaces between the cells of the tissues. This fluid released out is called the

a) Intrastitial fluid b) Interstitial fluid c) Nutritional fluid d) Vital fluid

74. During the process of blood coagulation, vitamin-K helps in the

a) Formation of prothrombin
b) Formation of thromboplastin
c) Conversion of fibrinogen into fibrin
d) Conversion of prothrombin into thrombin

75. Identify *A* to *F* in the given diagram of human heart and choose the correct option

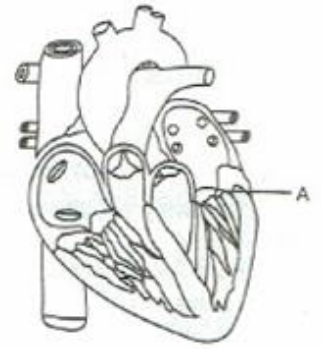


a) A-Vena cava, B-Right atrium, C-Left atrium, D-Right ventricle, E-Left ventricle, F-Interventricular septum
b) A-Vena cava, B-Right atrium, C-Right ventricle, D-Left ventricle, E-Left auricle, F-Interventricular septum
c) A-Vena cava, B-Right atrium, C-Right ventricle, D-Left atrium, E-Left ventricle, F-Interventricular septum
d) A-Vena cava, B-Left atrium, C-Right ventricle, D-Left ventricle, E-Right atrium, F-Interventricular septum

76. Which of the following blood vessels in the circulatory system of frog has more oxygenated blood?

a) Pulmocutaneous artery
b) Pulmocutaneous vein
c) Pulmonary artery
d) Precaval veins

77. Which of the following statement is not related to the region labelled as 'A' in the given diagram?



a) Through mitral valve, it communicates with left ventricle
b) Through tricuspid valve, it communicates with left ventricle
c) Pulmonary vein brings blood to it

d) It is separated from the other auricle through interauricular septum

78. To which of the following, bundle of His passes stimulus of contraction?
a) AV-node b) SA-node c) Purkinje fibre d) Atrium

79. Haemolymph is the term used for the blood of the organism having
a) Water circulatory system
b) Closed circulatory system
c) Open circulatory system
d) Blood circulatory system

80. Carotid artery supplies oxygenated blood to
a) Lungs b) Intestine c) Brain d) None of these

81. The blood pumped by the …A… ventricle enters the …B… artery, whereas the …C… ventricle pumps blood into the …D…
Choose the correct option for A, B, C and D
a) A-right, B-pulmonary, C-left, D-aorta
b) A-left, B-pulmonary, C-right, D-aorta
c) A-left, B-pulmonary, C-right, D-vena cava
d) A-right, B-pulmonary, C-left, D-vena cava

82. The deposition of lipids on the wall lining, the lumen of large and medium-sized arteries is referred to as
a) Deep vein thrombosis
b) Stokes-Adam's syndrome
c) Osteoporosis
d) Atherosclerosis

83. Which test tube is not used from the given option for keeping the blood in non-coagulated state? (for analysis of blood corpuscles)
a) Test tube with heparin
b) Test tube with calcium bicarbonate
c) Test tube with sodium oxylate
d) Test tube with low temperature

84. The closed circulatory system is found in
a) Insects b) Lobsters c) Frog d) Clams

85. SA node is called the pacemaker of heart because
a) It can change the 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 signals
d) It initiates and maintains the rhythmic contractile activity of heart

86. A substance present over the surface of RBCs and is genetically heritable is called as
a) Blood group b) Haemoglobin c) Antibody d) None of these

87. Tachycardia is
a) Fast heart rate b) Slow heart rate c) Stop heart rate d) Normal heart rate

88. In amphibians and reptiles, the …A… atrium receives oxygenated blood from the gills/lung/skin and …B… atrium gets the …C…. blood from other body parts
Choose the correct option for A, B and C
a) A-right, B-left, C-deoxygenated
b) A-right, B-left, C-oxygenated
c) A-left, B-right, C-deoxygenated
d) A-left, B-right, C-oxygenated

89. Which blood vessels carry blood from different parts of your body to the heart?
a) Capillaries b) Arteries c) Veins d) All of these

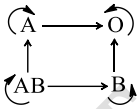
90. The vein that does not directly open into the heart is
a) Pre-caval b) Post-caval c) Pulmonary d) Posterior mesenteric

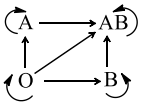
91. Which one of the following has an open circulatory system?
a) *Pheretima* b) *Periplaneta* c) *Hirudinaria* d) *Octopus*

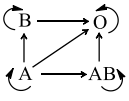
92. Purkinje fibres are present in
a) Brain b) Heart c) Blood d) Lungs

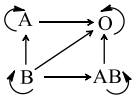
93. Pulmonary circulation is
a) Left auricle $\xrightarrow[\text{blood}]{\text{Oxygenated}}$ Lungs $\xrightarrow[\text{blood}]{\text{Deoxygenated}}$ Right ventricle
b) Left auricle $\xrightarrow[\text{blood}]{\text{Deoxygenated}}$ Lungs $\xrightarrow[\text{blood}]{\text{Oxygenated}}$ Right ventricle
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

94. Which one of the following statements is correct regarding blood pressure?
    a) 100/55 mmHg is considered an ideal blood pressure
    b) 105/50 mmHg makes one very active
    c) 190/110 mmHg may harm vital organs like brain and kidney
    d) 130/90 mmHg is considered high and requires treatment
95. The heart muscles are
    a) Striated and involuntary
    b) Striated and voluntary
    c) Smooth and involuntary
    d) Non-striated and involuntary
96. Patient with unknown blood group needs immediate blood transfusion. In this case, which blood do you suggest to give that patient immediately?
    a) Blood group-B b) Blood group-AB c) Blood group-A d) Blood group-O
97. The second step in the coagulation of blood is catalyzed by
    a) Thrombin b) Factor-XIII c) Factor-XII d) Heparin
98. The wall of the ventricles are much thicker than that of atrium because
    a) It has to pump the blood
    b) It has to receive the blood
    c) It is present below the atrium
    d) It has to store the blood
99. Sequence of electrical impulse in heart beat is
    a) AV node → pacemaker → auricles → ventricles
    b) Ventricle → pacemaker → AV node → auricle
    c) Pacemaker → atria → AV node → ventricle
    d) Pacemaker → AV node → atria → ventricle
100. Which chamber of the human heart has the thickest muscular wall?
    a) Left auricle b) Left ventricle c) Right auricle d) Right ventricle
101. In humans, blood passes from the post caval to the diastolic right atrium of heart due to
    a) Pushing open of the venous valves
    b) Suction pull
    c) Stimulation of the sino-auricular node
    d) Pressure difference between the caval and atrium
102. In the ventricular diastole, the …A… valve closes. This causes the second heart sound …B… . Choose the correct option for A and B
    a) A-Semilunar; B-Dub b) A-Mitral; B-Dub c) A-Bicuspid; B-Dub d) A-Tricuspid; B-Dub
103. Which of the given option is correct about blood groups and donor compatibility?
    a) 

    b) 

    c) 

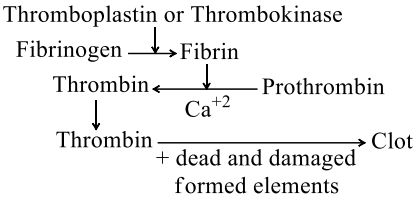
    d) 

104. Which of the following sentences is correct?
    I. ECG is of a great clinical significance
    II. Electrocardiograph is the recording of electrical changes during the cardiac cycle
    III. 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)
    IV. Normal activities of the heart are regulated intrinsically
    V. Electrocardiogram is the electrical activity of heart
    The option with correct statements is
    a) I, II, III and IV b) I, III, IV and V c) II, III, IV and V d) I, II, IV and V
105. Cardiac output is determined by
    a) Heart rate b) Stroke volume c) Blood flow d) Both (a) and (b)
106. Viper venom affects
    a) Circulatory system b) Nervous system c) Respiratory system d) None of these
107. A circulatory system, which is formed by capillaries and ends with capillaries is

a) Renal
b) Hepatic
c) Double circulatory system
d) Hypophysial portal system

108. Blood leaving the liver and going towards heart is rich in
a) Bile
b) Urea
c) Ammonia
d) Oxygen

109. Which is correct about blood clotting?

a)


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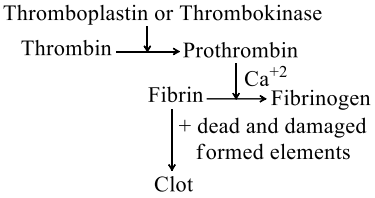

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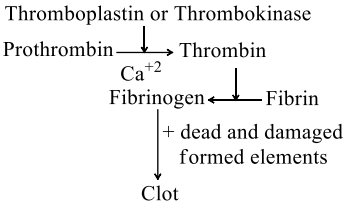

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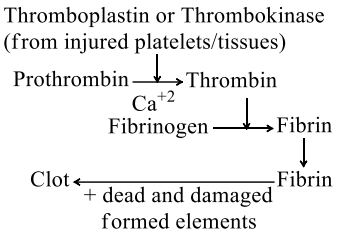


110. Maximum amount of oxygen is lost from the blood in the
a) Capillaries surrounding the tissue cells
b) Arteries of the body
c) Capillaries surrounding the alveoli
d) Left auricle of the heart

111. Atherosclerosis is caused by deposition of
a) Calcium
b) Fat and cholesterol
c) Deposition of fibrous tissue
d) All of the above

112. Which of the following are located in tunica media of human blood vessels?
a) Collagen fibres and smooth muscle
b) Squamous epithelium and striated muscle
c) Yellow fibres and smooth muscle
d) Yellow fibres and striated muscle

113. Duration of a cardiac cycle is
a) 0.6 second
b) 0.7 second
c) 0.8 second
d) 0.9 second

114. The myocardium is found in
a) Heart of mammals
b) Brain of mammals
c) Lungs of mammals
d) Testes of mammals

115. Normal activities of the heart are regulated
a) Extrinsically
b) Intrinsically
c) Both (a) and (b)
d) None of these

116. During each cardiac cycle, prominant sounds are produced which can be easily heard through stethoscope. They are
a) Lub
b) Dub
c) Tick
d) Both (a) and (b)

117. Serum is
a) Blood without corpuscles
b) Blood without fibrinogen
c) Blood without fibrinogen and corpuscles
d) Otherwise called as plasma

118. Neural centre in medulla oblongata can moderate the cardiac function through
a) ANS (Autonomic Nervous System)
b) Sympathetic nervous system

c) Parasympathetic nervous system d) Somatic nervous system

119. Maximum surface area of circulating system is seen in
a) Heart b) Capillaries c) Arterioles d) Veins

120. The normal level of haemoglobin per 100mL of blood in women is
a) 14 g b) 18 g c) 12 g d) 20 g

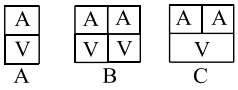
121. Rh^- person donated blood to Rh^+person for the second time. Then,
a) Rh^- person will die b) Nothing happens to Rh^+ person
c) Rh^+ blood starts reacting to Rh^- blood d) Rh^+ person will die

122. Systemic circulation is
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

123. 72 beats per minute heart beat rate of man is controlled by
a) SA-node b) Ventricles c) Purkinje fibres d) AV-node

124. Which one of the following is matching pair?
a) Lubb – Sharp closure of AV valves at the beginning of ventricular systole
b) Dup – Sudden opening of semilunar valves at the beginning of ventricular diastole
c) Pulsation of the radial artery – Valves in the blood vessels
d) Initiation of the heart beat – Purkinje fibres

125. A = Auricle, V = Ventricle



Identify the correct examples of figures *A*, *B* and *C*
a) A-Fishes, B-Reptiles, C-Birds b) A-Fishes, B-Amphibians, C-Mammals
c) A-Fishes, B-Mammals, C-Reptiles d) A-Fishes, B-Birds, C-Mammals

126. Which of the following sequences is truly a systemic circulation pathway?
a) Right ventricle → Pulmonary aorta → Tissues → Pulmonary veins → Left auricle
b) Right auricle → Left ventricle → Aorta → Tissues → Veins → Right auricle
c) Left auricle → Left ventricle → Pulmonary aorta → Tissues → Right auricle
d) Left auricle → Left ventricle → Pulmonary aorta → Arteries → Tissues → Veins → Right atrium

127. Haemoglobin contains
a) Fe^{2+} b) Mg^{2+} c) Na^{2+} d) Ca^{2+}

128. Which of the following is main negative mineral ion in extracellular fluid?
a) SO_4^{2-} b) Cl^- c) NO_2^- d) OH^-

129. Atrial natriuretic hormone is produced by
a) Kidney b) Heart c) Duodenum d) Thyroid gland

130. The branches of the nodal tissue, which give rise to minute fibres throughout the ventricular musculature of the respective sides are called
a) Sino auricular node b) Atrio ventricular node
c) Purkinje fibre d) Bundle of His

131. The valves in the heart allows the blood flow in which direction?
I. From atria to ventricles
II. From ventricles to pulmonary artery
III. From pulmonary artery to aorta
Choose the correct option

a) I and II b) II and III c) III and I d) All of these

132. Heart sound 'dup' is caused due to closing of
a) Valve b) Tricuspid valve c) Semilunar valve d) None of the above

133. SA-node is located in
a) Lower lateral wall of right atrium b) Upper lateral wall of right atrium
c) Upper lateral wall of left atrium d) Lower lateral wall of left atrium

134. Which of the following is the correct pathway for propagation of cardiac impulse?
a) SA node → AV node → Bundle of His → Purkinje fibres
b) AV node → Bundle of His → SA node → Purkinje fibres
c) SA node → Purkinje fibres → AV node → Bundle of His
d) Purkinje fibres → AV node → SA node → Bundle of His

135. The blue baby syndrome results from
a) Excess of chloride b) Methaemoglobin
c) Excess of dissolved oxygen d) Excess of TDS (Total Dissolved Solids)

136. 'Bundle of His' are
a) Nervous tissue supplied to ventricles b) Nervous tissue supplied to heart
c) Muscular tissue supplied to ventricles d) Muscular tissue supplied to heart

137. Most abundant cells in the human blood are
a) WBC b) Plasma cells c) RBC d) Platelets

138.

Blood Group	May Receive Blood	May Donate Blood
O	O	Z
A	X	A, AB
B	B, O	B, AB
AB	*Y*	*P*

Choose the correct option for *X*, *Y*, *Z* and *P*
a) X-A,O, Y-O,A, B, AB, Z-O,A,B, AB, P-A,B b) X-A, Y-O,A, B, AB, Z-O,A,B, AB, P-A,B
c) X-O, Y-O,A, B, AB, Z-O,A,B, AB, P-A d) X- O, Y-O,A, B, AB, Z-O,A,B, AB, P-B

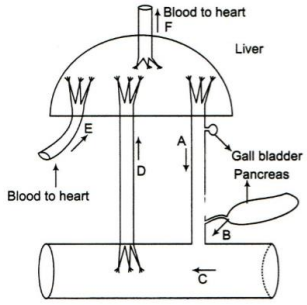
139. The cardiac cycle in normal person is about
a) 0.5 second b) 0.8 second c) 1.0 second d) 1.2 second

140. In diastole, heart is filled by
a) Mixed blood b) Venous blood c) Oxygenated blood d) Deoxygenated blood

141. Extrinsic factors (blood clotting) are the factors triggered by release of
a) Thromboplastin b) Heparin c) Histamin d) Fibrinogen

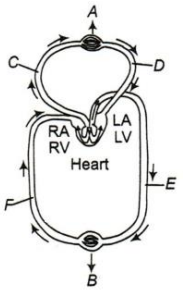
142. Purkinje fibres are present in
a) Left auricle b) Right auricle
c) Ventricle myocardium d) SAN

143. The diagram below shows how things get to and from the liver. They are labelled as A, B, C, D, E and F. Which one of the following labellings is the correct one?

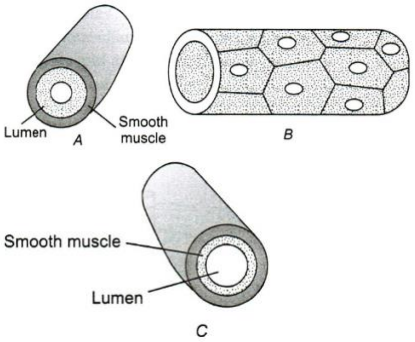


a) A is the hepatic portal veing and E is the hepatic vein
b) C is the intestine and F is the hepatic portal vein
c) D is the hepatic portal vein and F is the hepatic vein
d) B is the pancreatic artery and E is the hepatic artery

144. Identify the correct set of arteries formed from each common iliac artery of rabbit.
    a) Internal iliac, External iliac, Vesicular, Lumbar, Posterior epigastric arteries
    b) Internal iliac, External iliac, Vesicular, Posterior, Mesenteric epigastric arteries
    c) Internal iliac, External iliac, Vesicular, Uterine, Posterior epigastric arteries
    d) Internal iliac, External iliac, Uterine, Lumbar, Posterior epigastric arteries
145. Cardiac output is
    a) Volume of the blood pumped out by each ventricle per minute
    b) Volume of the blood contained in the entire heart
    c) Volume of the oxygenated blood pumped by heart
    d) Volume of the deoxygenated blood pumped by heart
146. Identify *A* to *F*



    Choose the correct option
    a) A-Lungs, B-Body parts, C-Pulmonary vein, D-Pulmonary artery, E-Dorsal aorta, F-Vena cava
    b) A-Lungs, B-Body parts, C-Pulmonary artery, D-Pulmonary vein, E-Dorsal aorta, F-Vena cava
    c) A-Lungs, B-Body parts, C-Pulmonary artery, D-Pulmonary vein, E-Vena cava, F-Dorsal aorta
    d) A-Body parts, B-Lungs, C-Pulmonary artery, D-Pulmonary vein, E-Vena cava, F-Dorsal aorta
147. 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?
    a) The flow of blood into the aorta will be slowed down
    b) The 'pace maker' 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
148. An artificial pacemaker is implanted subcutaneously and connected to the heart in patients
    a) Having 90% blockage of the three main coronary arteries
    b) Having a very high blood pressure
    c) With irregularity in the heart rhythm
    d) Suffering from arteriosclerosis
149. Ventricular systole occurs
    a) After the auricular/atrial systole
    b) When tricuspid and bicuspid valve closes
    c) Both (a) and (b)
    d) None of the above
150. 'Bundle of His' can be named as a muscular tissue which is found between
    a) Ventricles
    b) Interatrial groove
    c) Atrium
    d) Atrio-ventriculae spectrum
151. Open circulatory system is present in
    VI. Arthropods
    VII. Annelids
    VIII. Chordates
    IX. Molluscs
    a) III only
    b) III and II
    c) I and IV
    d) IV only
152. Identify *A*, *B* and *C* in the given diagram



Choose the correct option

a) A-Artery, B-Capillary, C-Vein
b) A-Artery, B-Vein, C-Capillary
c) A-Vein, B-Artery, C-Capillary
d) A-Capillary, B-Artery, C-Vein

153. The important function of lymph is to
a) Transport oxygen to the brain
b) Transport carbon dioxide to the lungs
c) Return RBCs to the lymph nodes
d) Return interstitial fluid to the blood

154. In reptiles and amphibians, there is no clear cut separation of oxygenated and deoxygenated blood because they have
a) Only one atrium
b) Only one ventricle
c) Only two atria
d) Only two ventricles

155. In heart cells, which one serves as a second messenger speeding up muscle cell contraction in response to adrenaline?
a) cAMP
b) cGMP
c) GTP
d) ATP

156. Lymphocytes (20-25%) are of two major types, B and T forms. They are responsible for
a) Blood coagulation
b) Thickness of blood
c) Immune responses
d) All of these

157. Tricuspid valve is present in
a) Right atria and right ventricle
b) Left atria and left ventricle
c) Wall of atrium
d) Wall of ventricles

158. The first heart sound 'Lubb' occurs in which phase of the cardiac cycle?
a) Isometric relaxation
b) Atrial diastole
c) Ventricular systole
d) Ventricular diastole

159. The progenitors that are formed in bone marrow and differentiated elsewhere are
a) Pre NK-cells
b) Pre-erythroblast
c) Pre T-cells
d) Myeloblast

160. The largest RBCs have been seen in
a) Elephant
b) Whale
c) Amphibians
d) Man

161. Pulmonary artery differs from pulmonary vein in having
a) No endothelium
b) Strong valves
c) Branner's cells
d) Thick muscular walls

162. The structure of which of the following consists of a layer of single cell thickness?
a) Blood capillary
b) Artery
c) Venule
d) Arteriole

163. In normal humans, time taken for the normal blood clotting is
a) 5-25 min
b) 30-50 min
c) 4-10 min
d) Few sec

164. Universal donors and universal receipients are
a) A, B and O blood groups, respectively
b) O and AB blood groups, respectively
c) O and A blood groups, respectively
d) AB and O blood groups, respectively

165. If husband is Rh^+ and wife is Rh^- then
a) No problem with first child
b) Second child would have anaemia (erythroblastosis foetalis)
c) Second child would be normal
d) Both (a) and (b)

166. Platelets are
a) Also called thrombocytes
b) Cell fragments
c) Produced from megakaryocytes
d) All of the above

167. Which of the following matches correctly?
a) Inferior vena cava – Receives deoxygenated blood from the head and body
b) Superior vena cava – Receives deoxygenated blood from the lower body and

organs

c) Pulmonary artery – Carries deoxygenated blood to the lungs

d) Hepatic artery – Carries deoxygenated blood to the gut

168. A healthy individual has …A… grams of haemoglobin in every …B… mL of blood. These molecules plays a significant role in the transport of …C… gases.
Choose the correct option for A, B and C

a) A-12-16, B-100, C-respiratory
b) A-6-8, B-100, C-respiratory
c) A-7-10, B-1000, C-respiratory
d) A-16-20, B-1000, C-respiratory

169. How many double circulations are normally completed by the human heart, in one minute?

a) Eight
b) Sixteen
c) Seventy two
d) Thirty six

170. Maximum pressure of blood experienced during when blood enters from

a) Right ventricle to aorta
b) Right auricle to aorta
c) Left ventricle to aorta
d) Left auricle to aorta

171. Which of the following events do not occur during joint diastole?
I. All four-chamber are in relaxed state
II. Tricuspid and bicuspid are open
III. Semilunar valves are closed
IV. Blood from the pulmonary veins and vena cava flows into the left and right ventricles, respectively through the left and right atria
The correct option containing correct choice is

a) Only I
b) Only III
c) II and IV
d) None of these

172. Lymph is an important carrier for the transport of

a) Nutrients
b) Hormones
c) Platelets
d) Both (a) and (b)

173. Chordae tendinae are found in

a) Atria of heart
b) Ventricles of heart
c) Joints of legs
d) Joints of hands

174. Organisms which circulate water from their surrounding through their body cavities to facilitate the cells to exchange the substances are

a) Porifera
b) Sponges
c) Both (a) and (b)
d) None of the above

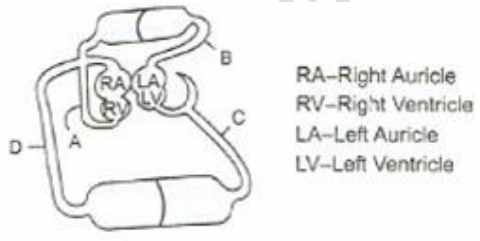
175. Source of thromboplastin in the human blood is

a) WBC
b) RBC
c) Blood platelets
d) Both (b) and (c)

176. Chordae tendinae

a) Are present close to AV valves
b) Open semilunar valves
c) Prevent the AV valves flaps from everting
d) Are present in auricle

177.



In the above given diagram, which blood vessel represents vena cava?

a) C
b) D
c) A
d) B

178. Life span of RBCs is

a) 50 days
b) 70 days
c) 120 days
d) 220 days

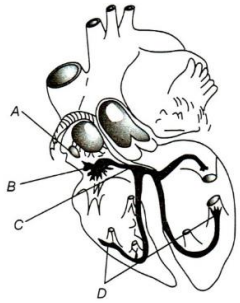
179. Formed element constitutes what percentage of the blood?

a) 55% of blood
b) 45% of blood
c) 35% of blood
d) 25% of blood

180. Neural signals through the sympathetic nerves (ANS) can increase the rate of heart beat by

a) Increasing heart output
b) Increasing the strength of ventricular contraction
c) Both (a) and (b)
d) Increasing the contraction of atrium

181. Cardiac output is
    a) Stroke volume × Heart rate = 72 mL/m
    b) Stroke volume × Heart rate = 5 L/m
    c) Stroke volume × Heart rate = 500 mL
    d) Stroke volume × Heart rate = 3 L/m
182. In bird and mammals, the oxygenated blood received by …A… and deoxygenated blood receive by …B… . The ventricles pump in out without any mixing up of oxygenated and deoxygenated blood
    Choose the correct option for A and B
    a) A-left atria, B-right atria
    b) B-right atria, A-left atria
    c) A-right ventricle, B-left ventricle
    d) A-left ventricle, B-right ventricle
183. Foramen ovale
    a) Connects the two atria in the foetal heart
    b) Is a condition in which the heart valves do not completely close
    c) Is a shallow depression in the interventricular septum
    d) Is a connection between the pulmonary trunk and the aorta in the foetus
184. The name of the pace maker of heart is
    a) Lymph node
    b) SA node
    c) Juxtaglomerular apparatus
    d) Semilunar valve
185. Hepatic portal system is a
    a) Vascular connection between the digestive tract and liver
    b) Vascular connection between the liver and lungs
    c) Vascular connection between the spleen and liver
    d) Vascular connection between the digestive tract and spleen
186. Ventricles are related to
    a) Heart only
    b) Brain only
    c) Both (a) and (b)
    d) None of these
187. Identify the correct labelling for A, B, C and D and choose the correct option accordingly



    a) A-Sinoauricular node, B-Atrioventricular node, C-Bundle of His, D-Purkinje fibre
    b) A-Sinoauricular node, B-Atrioventricular node, C-Purkinje fibre, D-Bundle of His
    c) A-Purkinje fibre, B-Atrioventricular node, C-Bundle of His, D-Sinoauricular node
    d) A-Purkinje fibre, B-Bundle of His, C-Sino auricular node, D-Atriventricular node
188. Which is largest among the given type of leucocytes?
    a) Eosinophils
    b) Basophils
    c) Monocytes
    d) Lymphocytes
189. Which system has a major role in defence against infection?
    a) Respiratory system
    b) Circulatory system
    c) Lymphatic system
    d) All of these
190. People living at sea level have around 5 million RBCs per cubic millimetre of their blood, whereas those living at an altitude of 5400 metres have around 8 million. This is because at high altitude
    a) People get pollution-free air to breathe and more oxygen is available
    b) Atmospheric oxygen level is less and, hence more RBCs are needed to absorb the required amount of oxygen to survive
    c) There is more UV radiation, which enhances RBCs production
    d) People eat more nutritive food, therefore, more RBCs are formed
191. Which of the following does not control the heart beat?
    a) Vagus
    b) Epinephrine
    c) Norepinephrine
    d) Glossopharyngeal nerve
192. Fats in the human body are absorbed through

a) Lymph b) Phagocytes c) Monocytes d) Both (b) and (c)

193. The graveyard of RBC is
a) Liver b) Stomach c) Spleen d) Bone marrow

194. Angina occurs due to
a) When enough oxygen is reaching to heart muscle
b) When not enough oxygen is reaching to heart muscle
c) The deposition of carbohydrates artery
d) The deposition of protein in artery

195. Haemoglobin molecule is made up of
a) One α-chain and one β-chain b) Two α-chains and two β-chains
c) Two α-chains and one β-chain d) One α-chain and two β-chains

196. Arteries are best defined as the vessels which
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

197. Autoexitable fibres/nodes are called
a) Nodal musculature b) Cardiac nerves c) Neurons d) All of these

198. The name Rh blood group is derived from
a) Chimpanzee b) Monkey c) Man d) Primitive man

199. A specialised cardiac musculature called …A… tissue is also distributed in the heart. A patch of this tissue is present in the right upper corner of the right atrium called …B… . Another mass of this tissue is seen in the lower left corner of the right atrium close to the atrio-ventricular septum called …C…
Choose the correct option for A, B and C
a) A-Nodal tissue, B-SAN, C-AVN b) A-Nodal tissue, B-AVN, C-SAN
c) A-AVN, B-Nodal tissue, C-SAN d) A-SAN, B-AVN, C-Nodal tissue

200. Advantage of closed circulatory system is that
a) Exchange occurs more rapidly b) Flow of blood more precisely regulated
c) It can support high metabolic activity d) All of the above

201. Which of the following statements is true for lymph?
a) WBCs and serum
b) All components of blood except RBCs and some proteins
c) RBCs, WBCs and plasma
d) RBCs, proteins and platelets

202. Subsequent normal pregnancies of Rh^+ husband and Rh^- wife could be possible by
a) Administrating and Rh-antibody to the mother just after the delivery of 1st child
b) Transfusion of blood to the 2nd baby just after the birth
c) Living anti-Rh antibody to the 2nd baby just after the birth
d) All of the above

203. Major proteins in the human blood are
I. fibrinogen II. globulins
III. albumins
Choose the correct combination of option
a) I and II b) II and III c) I and III d) I, II and III

204. Which of the following organs can be called a sort of 'blood bank'?
a) Heart b) Spleen c) Liver d) Lungs

205. Cascade theory of blood clotting was given by
a) William Harvey b) Mac Ferlane c) Karl Landsteiner d) S Hales

206. During cardiac cycle, about …A…% of ventricular filling occurs, prior to the arterial contraction …B…% ventricular filling occurs due to arterial contraction
Choose the correct option for A and B

a) A-30; B-70 b) A-70; B-30 c) A-40; B-60 d) A-60; B-40

207. Prothrombinase is formed in the presence of
a) Ca^{2+} b) Mg^{2+} c) Fe^{2+} d) Fe^{3+}

208. The artery, which supplies blood to the pericardium is
a) Brachial artery b) Coronary artery
c) Vertebral artery d) Internal mammary artery

209. Example of Rh incompatibility is
a) Mother Rh − ve and father Rh + ve b) Father Rh − ve and Mother Rh + ve
c) Both Rh – ve d) Both Rh + ve

210. Which of the following causes degradation of RBCs?
a) Sulphur compounds b) Arsenic compounds c) Hydrocarbons d) Ammonia

211. Serum is
a) Blood without fibrinogen b) Lymph without corpuscles
c) Blood without corpuscles and fibrinogen d) Lymph

212. Granulocytes and agranulocytes are the two main cateogories of
a) RBC b) WBC c) Thrombocyte d) Blood platelets

213. The difference between systolic and diastolic pressure in human is
a) 120 mm Hg b) 80 mm Hg c) 40 mm Hg d) 200 mm Hg

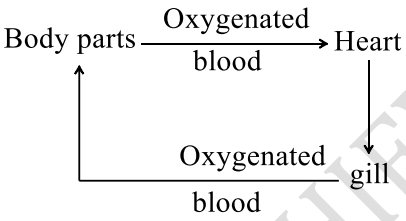
214. Diastolic pressure of a normal human is
a) 120 mm of Hg b) 70 mm of Hg c) 80 mm of Hg d) 70 mm of Hg

215. Systolic pressure in a normal human is
a) 70 mm of Hg b) 80 mm of Hg c) 90 mm of Hg d) 120 mm of Hg

216. RBCs have an average life span of
a) 90 days b) 100 days c) 120 days d) 140 days

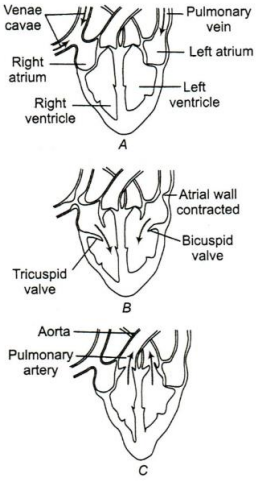
217. According to Cascade theory of blood clotting, how many factors are required in the process of blood clotting?
a) 12 b) 10 c) 13 d) 11

218.



Given diagram depicts the circulation in
a) Fishes b) Mammals c) Reptile d) Amphibian

219. What does diagram A, B and C indicates?



Choose the correct combination
a) A-Atrial diastole, B-Atrial systole, C-Ventricular systole

b) A-Atrial systole, B-Atrial diastole, C-Ventricular systole
c) A-Atrial diastole, B-Atrial systole, C-Ventricular diastole
d) A-Atrial systole, B-Atrial diastole, C-Ventricular diastole

220. Select the incorrect statements
I. Barr body is an another name for neutrophils
II. Agranulocytes are formed in the red bone marrow
III. Granulocytes are formed is the spleen and lymph node
IV. Lymphocytes exists as two major types, B and T lymphocytes
The correct option with incorrect statement is
a) I, II and III b) Only I c) Only III d) Only II

221. The valves, which allow blood to flow from the ventricles into the arteries and not in the opposite direction are
a) AV-valve (Atrio Ventricular valve) and semilunar valve
b) Bicuspid and tricuspid valve
c) Semilunar and tricuspid valve
d) Aortic and mitral valve

222. Study the following statements.
I.Plasma constitutes 45% of the human blood.
II.Albumin is a plasma protein, which helps in osmotic balance.
III.Factors responsible for the blood clotting process are present in the blood.
IV.Plasma without clotting factors is called serum.
IV.Minerals are not generally found in blood. Of the above statements.
a) Only V is wrong and all other I to IV are correct b) I and II are correct and III, IV and V are wrong
c) II and IV are correct and I, III and V are wrong d) II, III and IV are correct and I and V are wrong

223. Haemoglobin (Hb) transports oxygen from the lungs to tissues. The partial pressure of the oxygen in lungs is different from that tissues. Each Hb can bind to up to four oxygen molecules. Suppose, we have an equal number of Hb and oxygen molecules and all the oxygen molecules are in bounded form. Then, which of the following is true?
a) Almost all the Hb molecules have one bound oxygen molecule
b) Nearly half of all the Hb molecules are bound to two oxygen molecules
c) Nearly one-fourth of all the Hb molecules are bound to four oxygen molecules each
d) Most of the Hb molecules have one bound oxygen molecule each; the rest either have no bound oxygen or have two or more bound oxygen molecules

224. Which of the following plasma proteins is involved in the coagulation of blood?
a) Serum amylase b) A globulin c) Fibrinogen d) An albumin

225. In higher vertebrates, SA-node helps in
a) Conduction of blood b) Initiation of heart beat
c) Opening of tricuspid valve d) Opening of bicuspid valve

226. Which one has the thickest wall?
a) Right auricle b) Right ventricle c) Left auricle d) Left ventricle

227. Compare to blood our lymph has
a) No plasma b) Plasma without proteins
c) More WBCs and no RBCs d) More RBCs and less WBCs

228. Parasympathetic neural signal decreases the cardiac output by
a) Decreasing the speed of conduction of action potential
b) Slowing down the rate of heart beat
c) Increasing the speed of blood in veins
d) Both (a) and (b)

229. In which one of the following pairs, the two items mean one and the same thing?
a) Malleus – Anvil b) SA-node – Pacemaker
c) Leucocytes – Lymphocytes d) Haemophilia - Blood cancer

230. The low pressure below the arterial p_{O_2} results in
a) Release of CO_2 from the cell
b) Formation of haemoglobin
c) Production of bicarbonate
d) Formation of carbonic acid

231. Which one of the following human cells do not contain mitochondria?
a) Nerve cell
b) Red blood cell
c) Liver cell
d) White blood cell

232. Identify the incorrect statements and correct choose the correct option accordingly
I. Interstitial fluid (tissue fluid) and lymph have almost similar composition
II. Lymph and interstitial fluid have no larger proteins and RBC
III. Exchange of the nutrients and gases, etc., between the blood and cells always occurs through tissue fluid
IV. Interstitial fluid has the same mineral distribution as that of the plasma
V. Lymph can be defined as the blood minus RBC but has specialised lymphocytes
a) I and II
b) II and III
c) IV and V
d) None of the above

233. What is the principal cation in human blood?
a) Potassium
b) Sodium
c) Calcium
d) Manganese

234. Which of the statement is correct?
I. The closing and opening of the heart is through the valves during each heart beat
II. The movement of the impulse passes from the SA node to all the regions of the heart wall
III. The number of the times the heart beats in one minute is 60
IV. Change in the blood volume in all the chambers of the heart occurs during the cardiac cycle
The option with correct statements is
a) I, II and III
b) II, III and IV
c) I, II and IV
d) I, III and IV

235. Blood without corpuscles and fibrinogen is called
a) Lymph
b) Serum
c) Plasma
d) Platelets

236. Closed circulatory system is present in
a) Annelids and chordates
b) Arthropods and annelids
c) Arthropods and chordates
d) Molluscs and annelids

237. A heart murmur indicates a defective
a) Bundle of His
b) Heart valves
c) Sino-atrial node
d) Atrio-ventricular node

238. Pulmonary aorta carries
a) Blood from liver to lung
b) Blood from lung to heart
c) Pure blood from heart to lung
d) Impure blood from heart to lung

239. In which, blood circulation starts and ends in capillaries?
a) Portal system
b) Capillary system
c) Arterial system
d) Lymphatic system

240. Papillary muscles are found in mammalian
a) Auricles
b) Ventricles
c) Pinna
d) Eyes

241. The volume of blood each ventricle pumps out during a cardiac cycle is about
a) 70 mL
b) 5000 mL
c) 7 L
d) 1200 mL

242. CAD stands for
a) Carotid Arterial Dysfunction
b) Cerebral Artery Dysfunction
c) Coronary Artery Disease
d) Calcium Activated Disease

243. Blood pressure instrument records
a) Systolic pressure
b) Diastolic pressure
c) Both (a) and (b)
d) None of these

244. Heart of elephant is
a) Neurogenic
b) Myogenic
c) Both (a) and (b)
d) None of these

245. Blood is a
a) Mobile connective tissue
b) Liquid connective tissue
c) Both (a) and (b)
d) Semisolid connective tissue

246. Choose the correct statement about SA node

I. Located at lateral wall of the right atrium
II. Herat of heart
III. It initiates the rhythmic contractile activity of the heart and maintains it
IV. It is called pace keeper of the heart
V. It is called pace maker of the heart
The option with correct statements is
a) All except III b) All except IV c) All except V d) None of these

247. The systemic circulation provides nutrients, …A… and other essential substances to the …B… and takes …C… and other harmful substances away for elimination
Choose the correct option for A, B, C and D
a) A-CO_2, B-tissue, C-O_2 b) A-O_2, B-tissue, C-CO_2
c) A-O_2, B-tissue, C-NO_2 d) A-NO_2, B-tissue, C-CO_2

248. In an ECG, the depolarization of atria is indicated by
a) P-wave b) Q-wave c) R-wave d) S-wave

249. Which of the following is first to receive lymphatic duct from legs?
a) Left subclavian vein b) Right subclavian vein
c) Right lymphatic duct d) Thoracic lymphatic duct

250. All vertebrates posseses a …A… . Fishes have a …B… chambered heart with atrium and ventricles. Amphibians and reptiles have a …C… chambered heart. Bird and mammals have …D… chambered of heart
Choose the correct option
a) A-muscular chambered heart, B-3, C-2, D-4
b) A-muscular chambered heart, B-2, C-3, D-4
c) A-muscular chambered heart, B-4, C-3, D-2
d) A-muscular chambered heart, B-3, C-4, D-2

251. I. Atrioventricular valves
II. Semilunar valves
III. Right atrium
IV. Right ventricle
V. SAN
The correct pathway of RBC of from the option given below
a) V→III→I→IV→II b) V→III→I→II→IV c) V→III→IV→I→II d) I→II→III→IV→V

252. The number of valves that guard the opening at the origin of caroticosystemic aorta is
a) Two b) Three c) Four d) One

253. G-6-P dehydrogenase deficiency is associated with haemolysis of
a) Lymphocytes b) RBCs c) Platelets d) Leucocytes

254. Blood that flows from the lungs to the heart is bright red rather than dark red due to
a) Carbon dioxide b) Oxygen
c) Both (a) and (b) d) Due to mixing of sputum

255. Components essential for RBC formation is
a) Iron b) Vitamin-B_{12} c) Folate d) All of these

256. What will happen if a Rh – ve person is exposed to the Rh + ve person?
a) Antigen formation takes place b) −ve and +ve Rh antigen cancel out each other
c) Nothing will happen d) Antibody will form

257. Impulse of heart beat originates from
a) SA-node b) AV-node c) Vagus nerve d) Cardiac nerve

258. What will happen if a Rh^- person donate blood to a Rh^+ person for the first time?
a) Rh^- person will die b) Rh^+ person will die
c) Nothing will happen to both d) Rh^- will line and Rh^+ would be

259. Erythroblastosis foetalis is a disease in which
a) Adult have severe anaemia and jaundice
b) Female have severe anaemia and jaundice

c) Male have severe anaemia and jaundice
d) Foetus have severe anaemia and jaundice

260. At high altitude, RBCs of human blood will
a) Increase in number b) Decrease in number c) Decrease in size d) Increase in size

261. Bilirubin is the breakdown product of
a) Haemoglobin b) RBC c) WBC d) Platelets

262. Which of the following is right about blood coagulation?
I. Vitamin-B is necessary for the formation prothrominase
II. Conversion of fibrin to fibrinogen
III. Conversion of prothrombin to prothrombinase
The option with correct combination is
a) I and II b) II and III c) III and I d) None of these

263. Pace maker is
a) Instrument for measuring heart beat
b) Instrument for measuring pulse rate
c) AV node that provides impulse for heart beat
d) Sinu-auricular node that provides impulse for heart beat

264. When all the four-chambers of the heart are in relaxed state, it is called
a) Joint systole b) Joint diastole c) Systole d) Diastole

265. The pH of blood is
a) Between 7-8 b) Between 2-4 c) Between 12-14 d) Between 2-5

266. Manifestation of increase in the blood pressure of a person is called
a) Hypertension b) Artherosclerosis c) Arteriosclerosis d) None of these

267. Lymph is a colourless fluid containing specialised
a) RBC b) Lymphocytes c) Cells d) Long lined cells

268. Cardiac cycle is a cyclic event that occur in
a) Single beat b) Double beat c) Atrium d) Ventricle

269. Increase of blood sugar level is known as
a) Diabetes insipidus b) Diabetes mellitus c) Hypoglycemia d) Both (a) and (b)

270. The animal, which has oval RBCs is
a) Humans b) Camel c) Dog d) Fish

271. The difference between blood and lymph is
a) Blood has RBCs and WBCs, while lymph has no cells
b) Blood has RBCs and WBCs, while lymph has only WBCs
c) Blood has WBCs, while lymph has RBCs
d) Blood has dissolve salt, while lymph has no cells

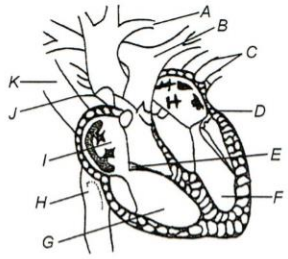
272. All reptiles have a three-chambered heart except
a) Snake b) Crocodile c) Lizard d) Both (b) and (c)

273. 'Heart of Heart' is
a) SA-node b) AV-node c) Bundle of His d) Purkinje fibres

274. The cardiac pacemaker in a patient fails to function normally. The doctors find that an artificial pacemaker is to be grafted in him. It is likely that it will be grafted at the site of
a) Atrioventricular bundle
b) Purkinje system
c) Sinuatrial node
d) Atrioventricular node

275. The first heart sound is produced when
a) Diastole begins
b) Semilunar valve close quickly
c) Interventricular pressure decreases
d) Bicuspid and tricuspid valve close quickly

276. In the diagram, the vertical section of the human heart is given, certain parts have been indicated by alphabets; choose the option in which these alphabets have been correctly matched with their respective parts



a) A-Aorta, B-Pulmonary vein, C-Pulmonary arteries, D-Left ventricle, E-Semilunar valves, F-Left auricle, G-Right auricle, H-Superior vena cava, I-Right ventricle, J-Tricuspid valves, K-Inferior vena cava
b) A-Aorta, B-Pulmonary artery, C-Pulmonary veins, D-Left auricle, E-Tricuspid and mitral valves, F-Left ventricle, G-Right ventricle, H-Inferior vena cava, I-Right auricle, J-Semilunar valves, K-Superior vena cava
c) A-Aorta, B-Superior vena cava, C-Inferior vena cava, D-Right ventricle, E-Tricuspid and mitral valves, F-Right auricle, G-Left auricle, H-Pulmonary vein, I-Left ventricle, J-Semilunar valves, K-Pulmonary artery
d) A-Aorta, B-Superior vena cava, C-Inferior vena cava, D-Left ventricle, E-Semilunar valves, F-Left auricle, G-Right auricle, H-Pulmonary artery, I-Right ventricle, J-Tricuspid valves, K-Pulmonary vein

277. Open circulatory system is present in
a) Arthropods and mammals
b) Mollusca and aves
c) Arthropods and Mollusca
d) Mammals and aves

278. Which wave of human heart out of PQRST is used for determining the heart beat of an individual?
a) P
b) QRS
c) T
d) RS

279. Cardiac centre is present in
a) Medulla oblongata
b) Cerebrum
c) Pons
d) Epithalamus

280. Refer the statements
I.Carbonic anhydrase is present in the erythrocytes.
II.In erythrocytes, the carbon dioxide combines with water and is transported.
a) Statement I is correct and is responsible for statement II
b) Statement I is not correct but statement II is correct
c) Both statements I and II are wrong
d) Statement I is correct but not involved in statement II

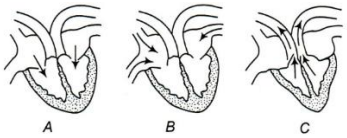
281. Generally, artificial pacemaker consists of one battery made up of
a) Nickel
b) Dry cadmium
c) Photo sensitive material
d) Lithium

282. Plasma is a straw coloured viscous fluid constituting nearly …A…% of the blood, …B…% of the plasma is water and the protein constitutes …C…% of it.
Choose the correct option for the blanks A, B and C
a) A-55, B-90-92, C-6-8
b) A-45, B-70-80, C-6-8
c) A-35, B-90-92, C-6-8
d) A-45, B-90-92, C-6-8

283. Coronary heart disease is due to the inadequate blood supply to
a) Heart ventricle
b) Heart auricle
c) Heart volume
d) Heart muscles

284. The role of pace maker in heart is to
a) Accelerate blood circulation
b) Inhibit backflow of blood
c) Initiate heart beat
d) Stimulate blood pressure

285. The accompanying diagram shows the three stages in the cardiac cycle



Which of the following is the correct sequence?
a) B, A, C
b) B, C, A
c) C, A, B
d) C, B, A

286. What is the correct order or events occurring in blood clotting?
I. Conversion of fibrinogen to fibrin

II. Formation of clot
III. Thromboplastin formation
IV. Conversion of prothrombin to thrombin
Choose the correct option
a) III, II, I and IV b) III, IV, I and II c) III, IV, II and I d) IV, I, III and II

287. Which one is correct?
a) Blood = Plasma + RBCs + WBCs + Blood platelets
b) Plasma = Blood – Lymphocytes
c) Lymph = Plasma + RBCs + WBCs
d) Both (b) and (c)

288. What happens when the pacemaker is non-functional?
a) Only the auricles will contract rhythmically
b) The cardiac muscles do not contract in a coordinated manner rhythmically
c) Only ventricles will contract rhythmically
d) Cardiac muscle will contract in a coordinated manner

289. Bicuspid and tricuspid valve opens when
a) Blood from the pulmonary artery and vena cava flows into the left and right ventricles, respectively
b) Blood from the pulmonary vein and vena cava flows into left and right ventricles, respectively
c) Blood from the pulmonary vein and vena cava flows into left and right atrium, respectively
d) Oxygen from the pulmonary vein and vena cava flows into left and right atrium, respectively

290. Lead concentration in blood is considered alarming if it is
a) 20 μg/100 mL b) 30 μg/100 mL c) 4 − 6 μg/100 mL d) 10 μg/100 mL

291. Systolic pressure in adult human is
a) 120 mm Hg b) 120/80 mm Hg c) 150/120 mm Hg d) 80 mm Hg

292. Which nodal fibres lies along the right and left ventricles (interventricular septum)?
a) Bundle of His b) Purkinje fibre c) Neural tissue fibre d) Cardiac tissue fibre

293. Which of the following option describes all the components of human blood?
a) A and B blood group b) AB and O blood group
c) Rh and ABO blood group d) Rh and AB blood group

294. ECG is a measure of
a) Rate of heart beat b) Difference in electric potential
c) Volume of blood pumped d) Ventricular contraction

295. Neutrophils are also called
I. acidophils
II. heterophils
III. polymorphs
Choose the option with suitable terms
a) I and II b) II and III c) I and III d) All of these

296. Factors for coagulation or clotting of the blood are also present in the …A… in an …B… form. Plasma without the clotting factors is called …C… .
Choose the correct option for the blanks A, B and C
a) A-plasma, B-inactive, C-serum b) A-plasma, B-active, C-serum
c) A-plasma, B-inactive, C-lymph d) A-plasma, B-active, C-lymph

297. Grouping of ABO blood is based on the
a) Surface antigens present on RBCs b) Surface lipids present on the cell membrane
c) Nature of all constituents d) Nature of RBC and WBC

298. Individuals having Rh antigen are called
a) Rh negative (Rh – ve) b) Rh positive (Rh + ve)
c) Rh (±) d) Rhesus positive

299. Which of the following statement is incorrect about the lymph
I. Lymph is colourful as it has haemoglobin but no RBC

II. The fluid present in the lymphatic system is called lymph
III. It contains specialised lymphocytes which are responsible for the immunity of the body
IV. Lymph is an important carrier for nutrients and hormones
V. Fats are absorbed through the lymph in the lacteals present in the intestinal villi
Choose the correct option
a) Only I b) III and IV c) II and III d) Only IV

300. Which of the following is a cell fragment?
a) Blood platelets b) Bone cells c) Lymphocytes d) Leucocytes

301. Why 1st child of Rh^+ husband and Rh^- wife doesn't have erythroblastosis foetalis?
a) Due to the absence of Rh antigen in mother's blood
b) Due to the presence of Rh antibodies in mother's blood
c) Due to the absence of Rh antibodies in mother's blood
d) Both (a) and (c)

302. The thread-like tendons of papillary muscles inserted upon the flaps of tricuspid and bicuspid valves are
a) Chordae tendinae b) Yellow elastin fibres c) Reticulate fibres d) Collagen fibres

303. Incomplete circulation is found in
I. reptiles II. amphibians
III. birds IV. mammals
The correct option with appropriate choices is
a) I and II b) III and IV c) III and II d) I and IV

304. 'Bundle of His' is a part of which one of the following organs in humans?
a) Heart b) Kidney c) Pancreas d) Brain

BODY FLUIDS AND CIRCULATION

BIOLOGY

: ANSWER KEY :

1)	a	2)	d	3)	c	4)	b	157)	a	158)	c	159)	c	160)	c
5)	c	6)	d	7)	a	8)	b	161)	d	162)	a	163)	c	164)	b
9)	a	10)	a	11)	a	12)	a	165)	d	166)	d	167)	c	168)	a
13)	b	14)	d	15)	a	16)	a	169)	c	170)	c	171)	d	172)	d
17)	a	18)	b	19)	a	20)	a	173)	b	174)	c	175)	c	176)	c
21)	a	22)	a	23)	b	24)	d	177)	d	178)	c	179)	b	180)	c
25)	c	26)	b	27)	a	28)	d	181)	b	182)	a	183)	a	184)	b
29)	b	30)	d	31)	d	32)	d	185)	a	186)	c	187)	a	188)	c
33)	d	34)	a	35)	b	36)	b	189)	c	190)	b	191)	d	192)	a
37)	c	38)	b	39)	c	40)	c	193)	c	194)	b	195)	b	196)	a
41)	d	42)	d	43)	c	44)	a	197)	a	198)	b	199)	a	200)	d
45)	a	46)	a	47)	a	48)	a	201)	b	202)	a	203)	d	204)	b
49)	c	50)	d	51)	c	52)	a	205)	b	206)	b	207)	a	208)	b
53)	d	54)	d	55)	a	56)	d	209)	a	210)	a	211)	c	212)	b
57)	b	58)	d	59)	a	60)	b	213)	c	214)	c	215)	d	216)	c
61)	a	62)	d	63)	b	64)	a	217)	c	218)	a	219)	a	220)	c
65)	a	66)	a	67)	c	68)	c	221)	c	222)	d	223)	c	224)	c
69)	d	70)	b	71)	c	72)	c	225)	b	226)	d	227)	c	228)	d
73)	b	74)	a	75)	c	76)	b	229)	b	230)	a	231)	b	232)	d
77)	b	78)	c	79)	c	80)	c	233)	b	234)	b	235)	b	236)	a
81)	a	82)	d	83)	a	84)	c	237)	b	238)	d	239)	a	240)	b
85)	d	86)	d	87)	a	88)	c	241)	a	242)	c	243)	c	244)	b
89)	c	90)	d	91)	b	92)	b	245)	c	246)	b	247)	b	248)	a
93)	c	94)	c	95)	a	96)	d	249)	d	250)	b	251)	a	252)	b
97)	a	98)	a	99)	c	100)	b	253)	b	254)	b	255)	d	256)	d
101)	d	102)	a	103)	b	104)	b	257)	a	258)	c	259)	d	260)	a
105)	d	106)	a	107)	d	108)	b	261)	b	262)	d	263)	d	264)	b
109)	d	110)	a	111)	d	112)	c	265)	a	266)	a	267)	b	268)	a
113)	c	114)	a	115)	b	116)	d	269)	b	270)	b	271)	b	272)	b
117)	c	118)	a	119)	b	120)	c	273)	a	274)	c	275)	d	276)	b
121)	b	122)	d	123)	a	124)	a	277)	c	278)	b	279)	a	280)	a
125)	c	126)	d	127)	a	128)	b	281)	d	282)	a	283)	d	284)	c
129)	b	130)	c	131)	a	132)	c	285)	a	286)	b	287)	a	288)	b
133)	b	134)	a	135)	b	136)	c	289)	c	290)	b	291)	a	292)	a
137)	c	138)	a	139)	b	140)	d	293)	c	294)	b	295)	b	296)	a
141)	a	142)	c	143)	c	144)	c	297)	a	298)	b	299)	a	300)	a
145)	a	146)	b	147)	d	148)	c	301)	c	302)	a	303)	a	304)	a
149)	a	150)	a	151)	c	152)	c								
153)	a	154)	b	155)	a	156)	c								

BODY FLUIDS AND CIRCULATION

BIOLOGY

: HINTS AND SOLUTIONS :

1 **(a)**
In frog, **pulmonary artery** is a paired artery that carry more deoxygenated blood from the right ventricle of the heart to the lungs.

2 **(d)**
If repeated checks of blood pressure of an individual is 140/90 (140 over 90) or higher, it show hypertension. High blood pressure leads to heart diseases and also affects the vital organs like brain and kidney

3 **(c)**
All except III.
Auto-Rhythmicity of Heart
Automatic rhythmicity of the heart is the ability to contract spontaneously. Mammalian heart is myogenic. It means heart beat results from a wave of electrical potential called cardiac impulse arising from sinoatrial node SA node and spreading over cardiac chambers.
SA-node lies in the wall of right atrium near opening of superior vena cava and contract about 72 times per minute. Form SA node cardiac impulse travels to atrioventricular node (lies between right atrium and ventricle)
Then pass to AV bundle (also called bundle to His) and its branches reaches to the Purkinje fibres in ventricles.
Bundle of His provides the only route for the transmission of wave of excitation from atria to ventricles. Purkinje fibres conducts the impulses five times more rapidly than surrounding cells. It forms a pathway for conduction of impulse that ensures that the heart muscle contracts in the most efficient manner

4 **(b)**
The correct pathway of the transmission of impulses in the heart beat is
SA-node → AV-node → Bundle of His → Purkinje fibres

5 **(c)**
Water is the medium of transportation, in sponges (water canal system) *Hydra* (gastro vascular system) and starfish (ambulacral system)

6 **(d)**
A buffer is a chemical or combination of chemicals that can both take up and release hydrogen ions. Carbonic acid (H_2CO_3) and sodium bicarbonate ($NaHCO_3$) help buffering human blood because H_2CO_3 is a weak acid that does not totally dissociate, when excess hydrogen ions are present in blood, the reaction goes to the left and carbonic acid forms to maintain the pH.

$$H_2CO_3 \rightleftharpoons H^+ + HCO_3^-$$

Carbonic acid — Hydrogen ion — Bicarbonate ion

7 **(a)**
In open circulatory system instead of capillaries, blood vessels join directly with the open sinuses. Blood is actually a combination of blood and interstitial fluid called haemolymph which is forced from the blood vessels into the large sinuses, where it actually, baths the internal organs

8 **(b)**
Primary blood cells are formed in bone marrow. The process of formation of blood is called haemopoiesis.

9 **(a)**
I, III, V.
Leucocytes or white blood corpuscles which are without haemoglobin and therefore, they are colourless and considerably larger than RBC. The normal WBC count is 6000-8000 per cubin mm of blood. Lower count is called leukopenia and high WBC count is termed as leukaemia or leucocytosis. The life span of WBC in man is about 10-30 days

10 **(a)**
70-75 min^{-1}.
Auto-Rhythmicity of Heart
Automatic rhythmicity of the heart is the ability to contract spontaneously. Mammalian heart is myogenic. It means heart beat results from a wave of electrical potential called cardiac impulse arising from sinoatrial node SA node and spreading over cardiac chambers.

SA-node lies in the wall of right atrium near opening of superior vena cava and contract about 72 times per minute. Form SA node cardiac impulse travels to atrioventricular node (lies between right atrium and ventricle)
Then pass to AV bundle (also called bundle to His) and its branches reaches to the Purkinje fibres in ventricles.
Bundle of His provides the only route for the transmission of wave of excitation from atria to ventricles. Purkinje fibres conducts the impulses five times more rapidly than surrounding cells. It forms a pathway for conduction of impulse that ensures that the heart muscle contracts in the most efficient manner

11 **(a)**
Haematuria is the presence of blood cells (RBCs) in urine. The presence of WBCs or pus in the urine is called **pyuria**.

12 **(a)**
An oval depression called **fossa ovalis** is present in the inter auricular septum within the right auricle. This depression is present as an oval foramen in embryo called foramen ovale. Through this foramen, the blood from right auricle is communicated towards left auricle in embryo.

13 **(b)**
Lymph acts as middle man of the body.

14 **(d)**
Coronary heart disease occurs due to insufficient blood supply to the heart muscle.

15 **(a)**
Pulse is rhythmic contraction and relaxation in the aorta and its main arteries. Thus, pulse is a wave of increase, which passes through arteries as the left ventricle pumps its blood into aorta. Pulse is a regular jerk of an artery. Pulse is usually taken on a radial artery in wrist.

16 **(a)**
Heart is mesodermal in origin

17 **(a)**
An elaborate network of vessels called the lymphatic system collects the interstitial fluid and drains it back to the major vein. This network is called lymphatic system and the process is called lymphatic circulation

18 **(b)**
Volume of both atrium is less than the volume of both ventricles.
Interventricular septum separates the right and left ventricles.
Atrioventricular septum separates the atrium and ventricles

19 **(a)**
A-atria, B-atrial systole, C-30.
Auto-Rhythmicity of Heart
Automatic rhythmicity of the heart is the ability to contract spontaneously. Mammalian heart is myogenic. It means heart beat results from a wave of electrical potential called cardiac impulse arising from sinoatrial node SA node and spreading over cardiac chambers.
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20 **(a)**
After the digestion of carbohydrates, proteins and fats, the amino acid, glucose, fatty acids, glycerol and vitamins, etc, are absorbed into the blood plasma from the alimentary tract.

21 **(a)**
Systemic heart refers to enteric heart in lower vertebrates. It pumps the blood to different body parts and not to lungs.

22 **(a)**
In the case of emergency like accidents, traumatic condition, the spleen can act as erythropoietic organ. That's why, it is called the blood bank

23 **(b)**
A conjugated polysaccharide heparin is released by the mast cells of connective tissues, which serves to prevent coagulation of blood, while it is flowing in intact blood vessels.

24 **(d)**
All except IV.
In open circulatory system instead of capillaries, blood vessels join directly with the open sinuses. Blood is actually a combination of blood and interstitial fluid called haemolymph which is forced from the blood vessels into the large

sinuses, where it actually, baths the internal organs

Open Circulatory System	Closed Circulatory System
Blood flows in the open tissue spaces.	Blood flows in the closed tubes.
Blood is in direct contact with the tissue cells.	Blood does not come in direct contact with tissue cells.
Exchange of material directly between the blood and tissue cells.	Exchange of material between tissue cells and blood occurs via tissue fluid.
Blood flow is slow.	Blood flow is rapid.
Blood has very low pressure.	Blood pressure is high.

25 **(c)**
Blood pressure means the arterial blood pressure. Normal systolic BP in healthy adult man is 120 mm Hg while diastolic blood pressure is 80 mm Hg.

26 **(b)**
Hepatic portal vein carries blood rich in absorbed food material such as glucose and amino acid from intestine to liver.

27 **(a)**
When the balloon of nitre-aortic balloon pump inflates more blood is carried to coronary artery.

28 **(d)**
Clotting disorders occurs mainly due to the reduction in the number of the platelets as platelets releases variety of substances which are involved in clotting

29 **(b)**
Blood sugar is glucose, which is converted into glycogen by insulin hormone in the liver and muscles. Usually, blood glucose level is about 80-100 mg/100 mL of blood 12 hours after a normal meal. After taking carbohydrate rich diet, blood sugar level raised. Fasting glucose value of blood is 70-110 mg/dL (decilitre) and post prependial (after breakfast) is 110-140 mg/dL.

30 **(d)**
Process of RBC formation is known as erythropoiesis. Iron, vitamin-B_{12} and folate are essential for RBC production. Erythropoiesis is completed in 72 hours. Erythropoietic organs in foetus are liver, lymph nodes and spleen. Whereas after birth, erythropoietic tissue is red bone marrow

31 **(d)**
Prothrombin is a plasma protein formed in the liver. Vitamin-K is required by the liver for its normal formation

32 **(d)**
Spiral valve is present in truncus arteriosis of amphibian heart guiding flow of different types of blood in the aortic arches.

33 **(d)**
Blood measures about 5-5.5 L in an adult man, constituting 30-35% of the total extracellular fluid
Glucose Its value is 80-100 mg/100 mL of blood
Cholesterol 50-180 mg/100 mL of blood
Urea Normal level is 17-30 mg/100 mL

34 **(a)**
Male is Rh^+ and female is Rh^-.
A special case of Rh incompatibility has been observed between Rh −ve blood of pregnant mother with Rh +ve blood of foetus. During the delivery of the first child there is a possibility of exposure of the maternal blood to small amount of Rh +ve blood from foetus.
In such cases, the mother starts preparing antibodies against Rh antigen in her blood. In the case of her subsequent pregnancies, the Rh antibody from the mother can leak to blood of foetus and destroy foetal RBC. This could be fatal to foetus or could cause severe anaemia and jaundice to the foetus. This condition in called erythroblastosis foetalis

35 **(b)**
Leucocytes or white blood corpuscles which are without haemoglobin and therefore, they are colourless and considerably larger than RBC. The normal WBC count is 6000-8000 per cubin mm of blood. Lower count is called leukopenia and high WBC count is termed as leukaemia or leucocytosis. The life span of WBC in man is about 10-30 days

36 **(b)**
As the two atria contract simultaneously. (Stimulated by SA node, blood is pumped into ventricles. This is called arterial systole

37 **(c)**
In haemoglobin, **aspartic acid** acts as blood buffer. It is a dicarboxylic amino acid. The carboxylic group of the side chain dissociates at physiological pH to give the negatively charged side chain.

38 **(b)**
In tissue, there is low partial pressure of O_2 and in lungs there is high pressure of O_2. So in graph, A indicates lungs and B indicates the tissues

39 **(c)**

Double circulation is the passage of the blood twice in the heart through the separate pathways for completing one cycle. *It consists of two parts*
(i) Pulmonary pathway (ii) Systemic pathway

40 **(c)**

Atrial diastole takes place when both the atria are filled with blood (having deoxygenated in right and oxygenated in left)

41 **(d)**

Monocytes are the largest agranular leucocytes and are phagocytic, while mast cells of connective tissues continuously release, is blood plasma, a conjugated polysaccharide, named heparin

42 **(d)**

Lymphoid Organs The organs which secretes lymph are called lymphoid organs. Beside the lymph nodes, tonsils, thymus gland. Payer's patches, liver and spleen are the other lymphoid organs which secretes lymph

43 **(c)**

Interstitial fluid

45 **(a)**

Tricuspid valve consists of three flaps, situated between the right atrium and the right ventricle of the mammalian heart.

46 **(a)**

Red bone marrow.
Erythrocytes or RBC are the most abundant of the three types of blood cells. They have a count of about 5-5.5 million per cubic mm of the blood in an adult male and 4.5-5 million/mm^3 in females. They are formed in the red bone marrow in the adults

47 **(a)**

The heart wall of frog composed of epicardium, myocardium and endocardium. The myocardium is composed of branched and striated yet involuntary cardiac muscles, which contracts and relax rhythmically at a fixed rate. The fibres of the self excitatory and conducting muscle of the heart are of three types –nodal fibres, transitional fibres and Purkinje fibres.

48 **(a)**

Types of Valve
(i) **Atrioventricular Valve** *These are two types*
1. **Bicuspid valve** It also called mitral valve which is present on the left side between the left atrium and left ventricle. It consists of two cups of flaps
2. **Tricuspid valve** It consists of three flaps or cups present between the right atrium and right ventricle

(ii) **Semilunar Valve** It is present where the arteries leaves heart. They are of two types (a) Pulmonary valve (b) Aortic valve, which are present at the base of pulmonary artery and aorta, respectively.
The pulmonary and aortic valves are virtually identical through aortic valve consists of thicker fibrous structure than the pulmonary valve

49 **(c)**

During the 1970s, researcher discovered that umbilical cord blood could supply the same kinds of blood-forming (haematopoietic) stem cells as a bone marrow donor and so, umbilical cord blood began to be collected and stored. Cord blood stem cells also have the potential to give rise to other cell types in the body.

50 **(d)**

Heart failure means the state of heart when it is not pumping blood effectively enough to meet the needs of body. It is sometimes called congestive heart failure because congestion of the lungs is one of the main symptoms of this. Heart failure is not the same as cardiac arrest or a heart attack. In cardiac arrest, heart stops beating while in a heart attack, the heart muscle is suddenly damaged by an inadequate blood supply.

51 **(c)**

Electrocardiograph is a type of machine used to obtain an ECG (electrocardiogram)

52 **(a)**

Arteries convey the blood (oxygenated) away from the heart. In arteries, blood flows at high pressure. The wall of arteries is made up of three layers.

53 **(d)**

All of the above.
Blood is a liquid, mobile connective tissue consisting of fluid matrix, plasma and formed elements

54 **(d)**

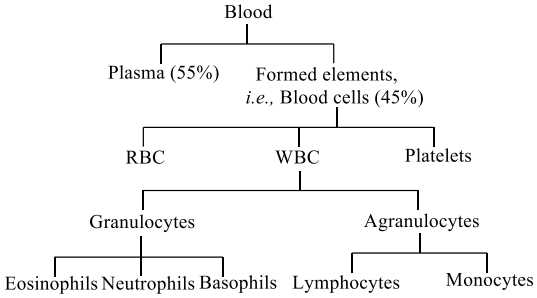
I-True, II-False.
Double circulation consists of two parts
(i) **Pulmonary circulation** In this the movement of blood take place from heart to lung and then from lung to heart

Right Auricle
↓ → Deoxygenated blood
Lungs
↓ → Oxygenated blood
Left Auricle

(ii) **Systemic Circulation** In this the movement of blood take place between heart and different part of body except lungs. It has arterial and venous system

55 **(a)**

A-I, II, III, B-IV, V.



56 **(d)**

To obtain a standard ECG a patient is connected to a machine with three electrical leads (one to each wrist and one to left ankle) that continuously monitor the heart activity. For detailed evaluation of the heart's function, multiple leads are attached to the chest region

57 **(b)**

RBCs are circular, biconcave and enucleated in mammals (except camel where they are oval and nucleated). It is biconcave so as to increase the surface area (For O_2 transfer) and allows easy passage through blood vessel

58 **(d)**

RBCs in mammals are formed in red bone marrow.

59 **(a)**

Vena cava (great veins) are of two major types

(i) **Superior vena cava** which collects the deoxygenated blood from the cephalic head region of the body.

(ii) **Inferior vena cava** which collects the deoxygenated blood from the lower portion of the body.

The vena cava drains deoxygenated blood to the right auricle

60 **(b)**

Artery	Supplies Blood to
Intercostal	Intercostal muscles
Inferior phrenic	Lower surface of diaphragm
Coeliac	
1.Left gastric artery	Stomach
2.Common hepatic artery	Pancreas, gall bladder, liver, etc
3.Splenic artery	Pancreas, stomach, spleen
Superior mesenteric	Various parts of small intestine
Inferior mesenteric	Most part of colon, rectum and anal canal

61 **(a)**

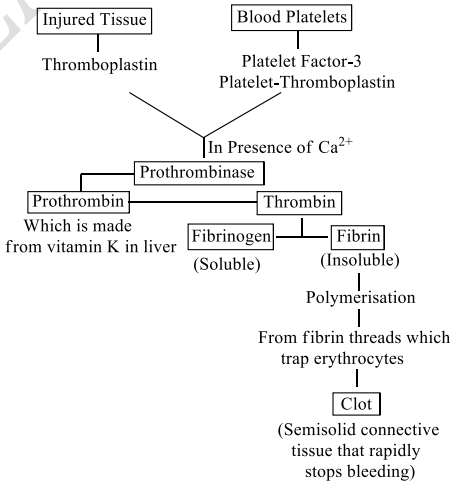
Adrenal gland (a gland present on the medullary region of kidney) secretes emergency hormone like epinephrine, nor epinephrine, which increases the heart rate

62 **(d)**

Bundle of His is present in the intraventricular septum connected to AV bundle and its branches reach the Purkinje fibres in the ventricles. AV bundles provides the only route for the transmission of wave of excitation the from atria to ventricles

63 **(b)**

By the traumatised cell at the place of injury



64 **(a)**

Adrenal gland controls blood pressure.

65 **(a)**

Coronary heart disease.

Coronary Artery Disease (CAD) Often referred to as atherosclerosis, affects the vessels that supply blood to heart muscle. It is caused by the deposition of fat, cholesterol, calcium and fibrous tissue, which makes lumen of the arteries narrower

Angina It is also called 'angina pectoris'. A symptom of acute chest pain appears when no enough oxygen is reaching the heart muscle

Heart failure It means the state of heart when it is not pumping blood effectively enough to meet the

needs of the body. It is sometimes called congestive heart failure because congestion of the lungs is one of the main symptoms of this disease

Cardiac-Arrest When the heart stops beating

Heart Attack When the heart muscles are suddenly damaged by an inadequate blood supply

66 **(a)**

In human body 98.5% of O_2 is transported by the respiratory pigment haemoglobin which is present in erythrocyte of blood. One molecule of haemoglobin can carry four molecules of O_2.

67 **(c)**

The lower limit of blood pressure is normally 80 mm Hg and is developed at diastole of ventricle. It is also known as diastolic blood pressure.

69 **(d)**

During ventricular systole, oxygenated blood is pumped into the aorta and deoxygenated blood is pumped into the pulmonary artery.

70 **(b)**

Pacemaker or SA-node lies in the wall of right atrium near the opening of the superior vena cava.

71 **(c)**

Duration of Cardiac Cycle (≅ 0.88 sec)

(i)	Atrial systole	0.18 sec
(ii)	Atrial diastole	0.08 sec
(iii)	Ventricular systole	0.30 sec
(iv)	Ventricular diastole	0.32 sec

Various events occur during cardiac cycle

Phase	SL Valves	AV Valves	Atria	Ventricles
Isome-tric relaxa-tion	Closed	Closed	Diastol-e	Diastole
Rapid-filling	Closed	Open	Diastol-e	Diastole
Diasta-sis	Closed	Open	Diastol-e	Diastole
Atrial systol-e	Closed	Open	Systole	Diastole
Ejecti-on	Open	Closed	Diastol-e	Systole

72 **(c)**

Blood groups and donor compatibility

S. No	Blood Groups	Antigen on RBC	Antibody in Plasma	Donor's Group
1.	A	A	Anti B	A, O
2.	B	B	Anti A	B, O
3.	AB	AB	Nil	AB,A,B, O
4.	O	Nil	Anti AB	O

73 **(b)**

This interstitial fluid is called the tissue fluid or lymph, which plays an important role in immunity against disease. It the has same mineral distribution as that of the plasma

74 **(a)**

Vitamin-K, also called anti-haemorrhagic factor, is a fat soluble vitamin and is essential for the formation of prothrombin in the liver.

75 **(c)**

A-vena cava, B-left atrium, C-right ventricle, D-left ventricle, E-right atrium, F-interventricular septum

76 **(b)**

The oxygenated blood from two lungs is collected by right and left pulmonary veins, which unit to form a common pulmonary vein (pulmocutaneous vein), which opens directly into the left auricle, on the dorsal side.

77 **(b)**

The atrioventricular opening between left atrium and left ventricle is guarded by bicuspid valve, while the right atrioventricular opening is guarded by tricuspid valve

78 **(c)**

The waves of contraction originating from SA-node, when reaches the AV-node (pace-setter), the latter is simulated and excitatory impulses are rapidly transmitted from it to all parts of the ventricle *via* bundle of His and Purkinje fibres.

79 **(c)**

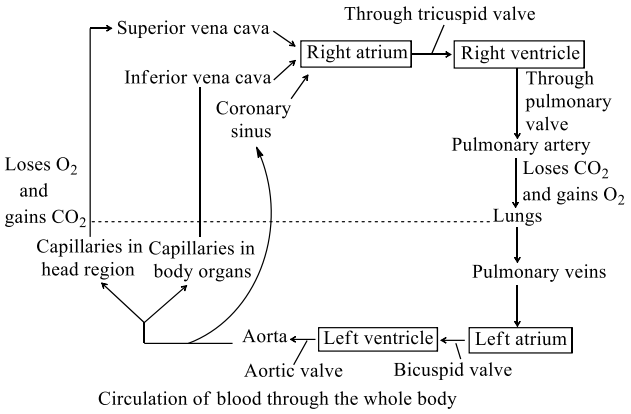
Open circulatory system.

In open circulatory system instead of capillaries, blood vessels join directly with the open sinuses. Blood is actually a combination of blood and interstitial fluid called haemolymph which is forced from the blood vessels into the large sinuses, where it actually, baths the internal organs

81 **(a)**

A-right, B-pulmonary, C-life, D-aocta.

Pulmonary artery differs from pulmonary vein in having thick muscular wall. The veins have internal semilunar valve to prevent the back flow of the blood



Circulation of blood through the whole body

82 **(d)**
Atherosclerosis refers to the condition of obstruction of arteries by localised deposits of lipids or fatty materials (including cholesterol) on the inner walls of large and medium-sized arteries. It arises due to high blood levels of cholesterol and can lead to heart attack or heart attack or heart failure.

83 **(a)**
Clotting of collected blood can be prevented by using silicon or adding chelating agents. Heparin is also non-coagulant but it alters the shape of RBC. So, test tube with heparin can't be used for studying the RBC

84 **(c)**
Closed circulatory system is commonly found in vertebrates such as frog, rabbit and man, whereas open circulatory system is found in arthropods (*e*. *g*., insects, spiders, crabs) and some molluscs.

85 **(d)**
SA node is known as the pacemaker of heart because the cells in SA node contract the most number of times per minute and because each wave of excitation begins here and acts as the stimulus for the next wave of excitation. In a diseased heart, the AV node can act as a pacemaker though it beats at comparatively less frequency (around 40-50 per min)

86 **(d)**
Blood groups (A, B, AB and O) are determined by the presence of agglutinogen (antigens). These are attached on the surface (plasma membrane) of RBCs and called Donen's membrane. Both antigens (A and B) are protein.

87 **(a)**
The term **tachycardia** is used for the fast heart rate (pulse rate above 100/minute) and when heart rate becomes below 50 pulses/minute, it is denoted by the term **bradychardia**.

88 **(c)**
A-left, B-right, C-deoxygenated

89 **(c)**
Veins carry the deoxygenated blood from body parts to heart. These have thin wall and valves to prevent back flow. The blood flow in low pressure. Arteries carry oxygenated blood from heart to body parts with high pressure.

90 **(d)**
Posterior mesenteric vein supplies blood to large intestine.

91 **(b)**
In open circulatory system, the blood flows in open spaces like lacunae and sinuses and it bathes the cells directly, *e*. *g*., arthropods (cockroach or *Periplaneta*).

92 **(b)**
Purkinje fibres are present in the lateral walls of the heart ventricles and help in conduction of cardiac impulse.

93 **(c)**
Double circulation consists of two parts
(i) **Pulmonary circulation** In this the movement of blood take place from heart to lung and then from lung to heart

Right Auricle
↓ → Deoxygenated blood
Lungs
↓ → Oxygenated blood
Left Auricle

(ii) **Systemic Circulation** In this the movement of blood take place between heart and different part of body except lungs. It has arterial and venous system

94 **(c)**
Hypertension is the term of blood pressure that is higher than normal (120/80). In this measurement, 120 mm. Hg (millimeter of mercury pressure) is the systolic, or pumping, pressure and 80 mm Hg is the diastolic, or resting pressure. If repeated checks of blood pressure (190/100 mm Hg) of an individual is 140/90 (140 over 90) or higher, it shows hypertension. High blood pressure (190/100 mm Hg) leads to heart diseases and also affects vital organs like brain and kidney.

96 **(d)**
In 'O' blood group there is no antigen, so it can be given in emergency condition when there is no time for checking the blood group. O is universal donor and AB is universal acceptor

97 **(a)**

In second step of blood coagulation, active thrombin changes fibrinogen to fibrin, which forms a meshwork of clot.

98 **(a)**
The wall of ventricles are much thicker than the atrium because ventricles have to pump the blood to pulmonary artery and aorta. Due to that functioning, the ventricles are thicker than atrium. Atrium only has to receive the blood so it is thinner than the ventricles

99 **(c)**
Sequence of electrical impulse in heart is
Sinoauricular node (Pacemaker of heart)
↓
Atria
↓
Atrioventricular node (AV node)
↓
Bundle of His
↓
Ventricles
↓
Purkinje fibre

100 **(b)**
Blood returning from lungs collects in the left atrium, passes into the left ventricle and is pumped into the body circulation. To bear the high pressure required to blood pumping in body, the left ventricle has thickest muscular wall.

101 **(d)**
Due to different pressure between the caval and atrium blood passes from the post caval to the diastolic right atrium of human heart.

102 **(a)**
Lub The first heart sound is associated with the closure of tricuspid and bicuspid valves
Dub The second heart sound is associated with the closure of semilunar valves

103 **(b)**

Blood Group	Receive Blood	Donate Blood
O	O	O, A, B, AB
A	A, O	A, AB
B	B, O	B, AB
AB	O,A, B, AB	AB

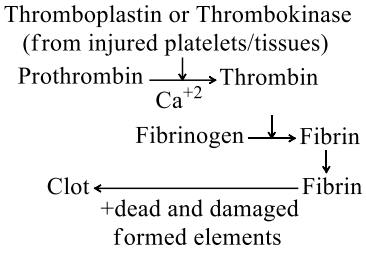
104 **(b)**
Electrocardiograph is not the recording of electrical changes during the cardiac cycle. Rather, it is the graph of electrical activity of the heart

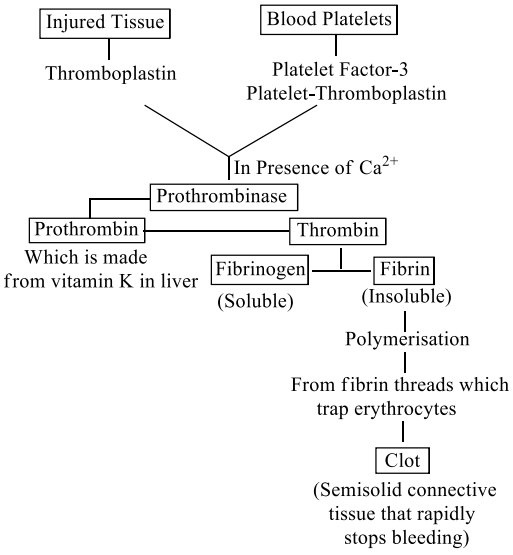
105 **(d)**
Cardiac output is the volume of blood pumped by the ventricles per unit time.
Cardiac output = Stroke volume × Heart rate
= 70mL/heart beat
Stroke volume is volume of blood pumped out of the heart at each beat.
Heart rate is number of beats per minute.
If heart rate and stroke volume increase, cardiac output also increases.

106 **(a)**
There are two categories of snake venoms-neurotoxic (*e*. *g*., cobras, kraits, sea snakes) and haemotoxic (*e*. *g*., vipers). Venom of viper cause tissue destruction and widespread haemorrhage. It affects the circulatory system.

107 **(d)**
Hypophysial portal system is a minor portal system that occurs in higher vertebrates. The system consists of a single Hypophysial portal vein, which is formed by capillaries in hypothalamus. It passes into anterior lobe of pituitary gland and breaks up into capillaries there.

108 **(b)**
Blood leaving the liver and going towards the heart is rich in urea.

109 **(d)**


By the traumatised cell at the place of injury


110 **(a)**
Gaseous exchange between blood and alveolar air

across respiratory membrane occurs by simple diffusion. The blood drained from lungs includes not only oxygenated blood but also some deoxygenated blood that has supplied its oxygen to tissue cells. The p_{O_2} of this blood is about 95-97 mm hg.

After receiving this blood from the lungs, the heart pumps it into the arteries, which carry it to all parts of the body, while flowing through the capillary networks in various tissues, his blood supplies oxygen to all cells in exchange of carbon dioxide. The average p_{O_2} in tissue fluids is about 40mm Hg, whereas the p_{O_2} in arterial blood supplying the tissues is 95 mm Hg. This pressure difference ensures vary rapid deoxygenation of the unstable oxyhaemoglobin in the tissue and diffusion of released oxygen into tissue fluid and then into the cells. The arterial blood normally supplies about 25% of its O_2 to the tissue.

111 **(d)**

All of the above.

Coronary Artery Disease (CAD) Often referred to as atherosclerosis, affects the vessels that supply blood to heart muscle. It is caused by the deposition of fat, cholesterol, calcium and fibrous tissue, which makes lumen of the arteries narrower

Angina It is also called 'angina pectoris'. A symptom of acute chest pain appears when no enough oxygen is reaching the heart muscle

Heart failure It means the state of heart when it is not pumping blood effectively enough to meet the needs of the body. It is sometimes called congestive heart failure because congestion of the lungs is one of the main symptoms of this disease

Cardiac-Arrest When the heart stops beating

Heart Attack When the heart muscles are suddenly damaged by an inadequate blood supply

112 **(c)**

Tunica media is the middle, thickest layer of blood vessels and is made up of yellow (elastin) fibres and envoluntary or unstriped or smooth muscle fibres. Tunica externa is rich in collagen fibres but has less elastin fibres, while tunica interna is made up of a single layer of simple squamous epithelial cells (endothelium) and yellow elastin fibres.

113 **(c)**

Duration of a cardiac cycle is 0.8 sec out of which atrial systole takes 0.1 sec, ventricular systole takes 0.3 sec and complete cardiac systole occurs in 0.4 sec

114 **(a)**

Myocardium consists of cardiac muscles resembling the striated muscles structurally and smooth muscles functionally. Myocardium is the middle layer. It contains epicardium on outside and endocardium towards inside.

115 **(b)**

Normal activities of heart are regulated intrinsically. *i.e.,* auto regulated by specialised muscle (nodal tissue). Hence, the heart is called myogenic

116 **(d)**

The closing of atrioventricular valves during ventricular systole produces the first heart sound, lub.

During ventricular diastole, the semilunar valves are closed and blood is forced back into the ventricles. Due to the high pressure developed in the vessels, this causes the second heart sound, dub

117 **(c)**

After clotting of blood, a water like fluid remains, it is called serum. Fibrinogen protein and other clotting factors are absent in this serum.

118 **(a)**

Autonomic nervous system.

A special neural centre in medulla oblongata can moderate the cardiac function through Autonomic Nervous System (ANS). Medulla oblongata is called the cardiac centre

119 **(b)**

Capillaries are microscopic and smallest blood vessels. Their exceedingly thin walls consists of just a thin tunica interna. Most tissues have a rich capillary supply but cartilage and epithelia lack capillaries. Capillaries do not function independently, instead they tend to form interweaving networks called capillary beds. The true capillaries number 10 - 100 per capillary beds depending on the organs or tissues served.

120 **(c)**

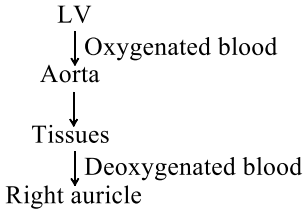
The average quantity of haemoglobin in males is 14.5 g/100 mL blood, in females 12.5 g/100 mL blood and in new born child the average amount of haemoglobin is 16.5 g/100 mL blood.

121 **(b)**

Nothing happens, when Rh^- person donated blood to Rh^+ person for the second time.

122 **(d)**

Systemic circulation



123 **(a)**
SA-node controls the rate of heart beat.

124 **(a)**
First sound of heart is lubb (a long and booming sound), created by the closure of atrio-ventricular valve (AV), tricuspid and bicuspid at the beginning of ventricular systole. At the beginning of ventricular diastole, the semilunar valves close, producing the second sound 'dup'.

125 **(c)**
A-Fishes, B-Mammals, C-Reptiles.
Fish Two-chambered heart. One atrium and one ventricle
Amphibian and Reptiles
Three-chambered heart, Two atrium (one left and one right) and one ventricle mammal four-chambered heart (two atria and two ventricle)

126 **(d)**
The systemic circulation pathway is -
Left auricle → Left ventricle → Pulmonary Aorta → arteries → tissues → Veins right atrium.

127 **(a)**
Haemoglobin is a respiratory pigment found in RBCs. It contains iron (Fe^{2+}).

128 **(b)**
Extracellular fluid is the fluid found outside the cells. This is found in blood, lymph, body cavities and in various channels. It has high concentration of sodium ions and chloride ions, while intracellular fluid has high concentration of potassium ions. This concentration is maintained with the help of $Na^+ - K^+$ pumps.

129 **(b)**
Atrial natriuretic hormone is produced by heart, which helps in regulating the sodium and water balance of the body.

130 **(c)**
Auto-Rhythmicity of Heart
Automatic rhythmicity of the heart is the ability to contract spontaneously. Mammalian heart is myogenic. It means heart beat results from a wave of electrical potential called cardiac impulse arising from sinoatrial node SA node and spreading over cardiac chambers.
SA-node lies in the wall of right atrium near opening of superior vena cava and contract about 72 times per minute. Form SA node cardiac impulse travels to atrioventricular node (lies between right atrium and ventricle)
Then pass to AV bundle (also called bundle to His) and its branches reaches to the Purkinje fibres in ventricles.
Bundle of His provides the only route for the transmission of wave of excitation from atria to ventricles. Purkinje fibres conducts the impulses five times more rapidly than surrounding cells. It forms a pathway for conduction of impulse that ensures that the heart muscle contracts in the most efficient manner

131 **(a)**
I and II.
Types of Valve
(i) **Atrioventricular Valve** *These are two types*
3. **Bicuspid valve** It also called mitral valve which is present on the left side between the left atrium and left ventricle. It consists of two cups of flaps
4. **Tricuspid valve** It consists of three flaps or cups present between the right atrium and right ventricle

(ii) **Semilunar Valve** It is present where the arteries leaves heart. They are of two types (a) Pulmonary valve (b) Aortic valve, which are present at the base of pulmonary artery and aorta, respectively.
The pulmonary and aortic valves are virtually identical through aortic valve consists of thicker fibrous structure than the pulmonary valve

132 **(c)**
'Dup' (a second heart sound) occurred by closing the semilunar valve.

133 **(b)**
SA-node is located in upper lateral wall of right atrium.

134 **(a)**
The heart is formed of cardiac muscles which have the property of excitability and conductivity. When the cardiac muscles are stimulated by a specific stimulus these got excited and initiate the waves (depolarization) of electric potential called **cardiac impulse**. Cardiac impulse is propagated through SA node → AV node → Bundle of His → Purkinje fibres.

135 **(b)**
Excess nitrate combines with haemoglobin and

forms non-functional methaemoglobine that inhibits oxygen transport. It is known as methaemoglobinemia or **blue baby syndrome**.

136 **(c)**
Bundle of His is a network of muscle fibres found in between two ventricles.

137 **(c)**
Erythrocytes or RBC are the most abundant of the three types of blood cells. They have a count of about 5-5.5 million per cubic mm of the blood in an adult male and 4.5-5 million/mm^3 in females. They are formed in the red bone marrow in the adults

138 **(a)**

Blood Group	May Receive Blood	May Donate Blood
O	O	O, A, B, AB
A	A, O	A, AB
B	B, O	B, AB
AB	O, A, B, AB	AB

139 **(b)**
The cardiac cycle in normal person takes about 0.8s. Atrial systole takes 0.1s, while atrial diastole is of about 0.7s.

140 **(d)**
During joint diastole, blood continues of flow into auricle through the great veins (superior and inferior vena cava), which bring venous blood from all parts of the body. During atrial diastole, venous blood again passes from the great veins to the auricle.

141 **(a)**
Extrinsic factors are triggered by thromboplastin. (Factor III), various factors are also needed which are collectively known as intrinsic system because it occurs inside blood vessel

142 **(c)**
Purkinje fibre are present at both ventricular myocardium for the proper contraction of ventricles

143 **(c)**
D is the hepatic portal vein and F is the hepatic vein

144 **(c)**
In pelvic region, each common iliac artery gives out an ilio-lumbar artery to supply the dorsal body wall and then, splits into a long external and short internal iliac arteries. This **external iliac artery** enters into the hindlimb of its side as **femoral artery**. The internal iliac splits into several branches to supply urinary bladder (vesicular), wall of rectum, anal region and also uterus in females.

145 **(a)**
Sequential events in the heart, which is cyclically repeated is called the cardiac cycle. It consists of systole and diastole of both the atria and ventricle

146 **(b)**
A-Lungs, B-Body parts, C-Pulmonary artery, D-Pulmonary vein, E-Doesal aocta, F-Vena cava

147 **(d)**
If chordae tendinae of the tricuspid valve become partially non-functional due to injury then the flow of blood into the pulmonary artery will be reduced.

148 **(c)**
SA-node (sinu-atrial node) heart beats and thereby sets the basic pace of the heart beat, hence, its name pacemaker. Pacemaker is a bundle of modified cardiac muscles. An artificial pacemaker is implanted subcutane- ously and connected to heart in patients with irregularity in the heart rhythm.

149 **(a)**
Ventricular Systole
Atrial systole force the blood to go to the ventricles. This takes place when tricuspid and bicuspid valves are open

150 **(a)**
Bundle of His is a network of muscle fibres found in between two ventricles

151 **(c)**
When the blood does not remain confined to the blood vessels and flows into spaces in the tissues, it is termed as open circulatory system, *e*. *g*., arthropods most molluscs.

152 **(c)**
A-vern, B-artery, C-capillary

153 **(a)**
The lymph acts as a middle man between the blood and the tissue cells as it passes on food and oxygen from blood to tissue cells and hands over excretory wastes, hormones and CO_2 from the body cells to blood.

154 **(b)**
Fish Two-chambered heart. One atrium and one ventricle
Amphibian and Reptiles
Three-chambered heart, Two atrium (one left and one right) and one ventricle mammal four-chambered heart (two atria and two ventricle)

155 **(a)**
Second messengers are chemicals, which speed up functions of hormones (first messenger). **cAMP** (Cyclic adenosine 3-5 monophosphate) is formed from ATP by adenylate cyclase and functions as second messenger for a number of activities, *e*. *g*., **adrenaline** mediated glycogenolysis, increased heart beat by speeding up muscle cell contraction, etc.

156 **(c)**
Agranulocytes are of two types
Lymphocytes (about 30%) They are smaller with large rounded nucleus. They are non-motile and non-phagocytic. They exists in two major forms: B and T lymphocytes. They produce antibodies, which are the key cells of immune response.
Monocytes (about 4%) They are the largest among all the type of leucocytes. They are motile and phagocytic in nature

157 **(a)**
In human heart, right auricle opens into right ventricle and the auriculo-ventricular aperture is guarded by a tricuspid valve. The opening of left auricle into left ventricle is guarded by bicuspid or mitral valve.

158 **(c)**
Ventricular Systole When the contraction of the ventricles occurs immediately after atrial systole, the pressure in the ventricles rises and closes the atrioventricular valves, preventing blood from returning to the atria.
Then the pressure opens the semilunar valves (three half moon shaped pockets) of aorta and pulmonary artery (the great artery) to make entry of blood into these vessels (ejection)
This lead to reduced volume of blood into the ventricles (about 40 to 50 mL). The closing of atrioventricular valves during ventricular systole produces the first heart sound lub

159 **(c)**
Pre T-cells are progenitors formed in bone marrow and differentiated elseshere.

160 **(c)**
The largest RBCs are found in amphibians (*Amphiuma*) of 70 − 80μ. In mammals, largest RBCs are found in elephant of 9.4 μ. The RBCs of man are 7.5 − 8 μ in size.

161 **(d)**
Pulmonary artery differs from pulmonary vein in having thick muscular wall. The veins have internal semilunar valve to prevent backflow of blood.

162 **(a)**
Capillaries were discovered by **Marcello Malpighi** in 1661. These are very thin-walled, because tunica externa and tunica media are absent. Capillary wall is formed by only tunica interna or endothelium. These connect arterioles to venules and specialized for exchanging substances with interstitial fluid. According to local tissue requirements, these can be constricted or dilated.

163 **(c)**
Time taken for the normal blood clotting varies from 4-10 min

164 **(b)**
Universal Donor = O blood group
Universal receipient = AB blood group

165 **(d)**
Both a and b.
A special case of Rh incompatibility has been observed between Rh −ve blood of pregnant mother with Rh +ve blood of foetus. During the delivery of the first child there is a possibility of exposure of the maternal blood to small amount of Rh +ve blood from foetus.
In such cases, the mother starts preparing antibodies against Rh antigen in her blood. In the case of her subsequent pregnancies, the Rh antibody from the mother can leak to blood of foetus and destroy foetal RBC. This could be fatal to foetus or could cause severe anaemia and jaundice to the foetus. This condition in called erythroblastosis foetalis

166 **(d)**
Blood platelets occur only in mammals. They are non-nucleated, round or oval biconvex and bud from megakaryocytes. They are much smaller than RBC. Blood platelets are the source of thromboplastin, necessary for blood clotting

167 **(c)**
5. Inferior vena cava – Receives deoxygenated blood from the lower body and organs
6. Superior vena cava – Receives deoxygenated blood from the head and body
7. Pulmonary artery - Carries deoxygenated blood to the lungs

8. Hepatic artery - Carries deoxygenated blood to the liver

168 **(a)**
A-12-16, B-100, C-Respiratory

169 **(c)**
As the ventricle is completely divided in birds, mammals and some reptiles (crocodiles, alligator), the left and right parts of the heart function as air tight conduits for pure and impure blood. The right part receives impure blood from whole body and sends it to the lungs for oxygenation. The left part receives purified blood from the lungs and supplies it to the whole body. Thus, the right and left parts of the heart respectively serve as completely separated pulmonary and systemic hearts. This is known as double heart circuit. In man, the rate of heart beat (double circulation) is about 75 times per minute.

170 **(c)**
The pressure exerted by the flow of blood on the elastic walls of the arteries is called blood pressure. Blood pressure is greater during the systole than during the diastole. Maximum pressure of blood experienced during entery of blood from left ventricle to aorta.

171 **(d)**
In the cardiac cycle, the first stage begins with the joint diastole. In that, four chambers of the heart are in relaxed state. As the tricuspid and bicuspid valves are open, blood from the pulmonary veins and vena cava flows into the left and right ventricle respectively, through the left and right atria. The semilunar valves are closed at this stage

172 **(d)**
Both a and b.
Lymph is a colourless fluid containing specialised lymphocytes (B and T cells) which are responsible for the immune response of the body. Lymph is also an important carrier for nutrients and hormones, etc. Fats are absorbed by the lymph in the lacteals present in the intestinal villi

173 **(b)**
Chordae tendinae are string-like processes in the heart that attach the edges of the bicuspid and tricuspid valves to the walls of the ventricles, prevent them from being forced back into the atria when the ventricles contract.

174 **(c)**
All living cells have to be provided with nutrients, O_2 and other essential substances. Also the waste or harmful substances produced have to be removed continuously. Different group of animals have evolved different method for this transport. Simple organism like sponges and coelenterates circulate water from their surroundings through their body cavities to facilitate the cells to exchange these substances

175 **(c)**
All the site of injury, blood platelets disintegrates and release thromboplastin

176 **(c)**
Both (bicuspid and tricuspid) valves are connected below to the walls of ventricles by chordae tendinae. They prevent the valves from turning inside out or from being forced upward during the contraction of ventricles

177 **(d)**
In the given diagram, D represents the vena cava

178 **(c)**
The life span of biconcave RBCs in man is about 120 days, whereas in frog (biconvex RBCs) is 100 days and in rabbit it is 80 days.

179 **(b)**
Formed elements constitutes about 45% of blood

180 **(c)**
Neural signals through the sympathetic nerves (part of ANS) can increase the rate of heartbeat by the strength of the ventricular contraction of cardiac output

181 **(b)**
Stroke volume = 70 mL/beat
Heart rate = 72 beat/minute
Cardiac output = Stroke volume × Heart rate
= 70 × 72 = 5040 mL/minute or approximately 5 L/min

182 **(a)**
In crocodiles, birds and mammals left atria receives oxygenated blood and right atria deoxygenated blood

183 **(a)**
Foramen ovale is an opening in the interatrial septum of the foetal heart through which both the atria communicate with each other. In adult this aperture is closed and represented by a small oval depression called fossa ovalis.

184 **(b)**
The heart beat originates from sinoatrial node (SA node) also called **pacemaker**, which lies in the wall of right atrium near the opening of superior vena cava. This can be remedied by surgical grafting of artificial pacemaker in chest of patient.

185 **(a)**
A unique vascular connection exists between the digestive tract and liver called hepatic portal system. The hepatic portal vein carries the blood from the intestine to liver before it is delivered to systemic circulation. A special coronary system of blood vessels is present in our body exclusively for circulation of the blood to and from the cardiac musculature

186 **(c)**
Ventricles are related to both heart and brain.

187 **(a)**
A-SA Node, B-AV Node, C-Bundle of His, D-Purkinje fibres

188 **(c)**
Monocytes (6-8%)
Largest among all types of leucocytes are monocytes. They are motile and phagocytic in nature. Since, they are the direct precursors of macrophages so, after entering into the tissue fluid, they transform into macrophages for phagocytising the invading microbes

189 **(c)**
Lymphatic system.
Lymph is a colourless fluid containing specialised lymphocytes (B and T cells) which are responsible for the immune response of the body. Lymph is also an important carrier for nutrients and hormones, etc. Fats are absorbed by the lymph in the lacteals present in the intestinal villi

190 **(b)**
At high altitudes, the atmospheric oxygen level is less and hence, more RBCs are needed to absorb the required amount of oxygen to survive. That is why, the people living at sea level have around 5 million RBCs/mm^3 of their blood, whereas those living at an altitude of 5400 m have around 8 million RBCs/mm^3 of their blood.

191 **(d)**
Glossopharyngeal nerve controls the posterior part of mouth cavity, therefore, it does not control the heart beats.

192 **(a)**
Lymph.
Lymph is a colourless fluid containing specialised lymphocytes (B and T cells) which are responsible for the immune response of the body. Lymph is also an important carrier for nutrients and hormones, etc. Fats are absorbed by the lymph in the lacteals present in the intestinal villi

193 **(c)**
The term graveyard of RBC is used for spleen

194 **(b)**
When not enough O_2 is reaching to heart muscles.
Coronary Artery Disease (CAD) Often referred to as atherosclerosis, affects the vessels that supply blood to heart muscle. It is caused by the deposition of fat, cholesterol, calcium and fibrous tissue, which makes lumen of the arteries narrower
Angina It is also called 'angina pectoris'. A symptom of acute chest pain appears when no enough oxygen is reaching the heart muscle
Heart failure It means the state of heart when it is not pumping blood effectively enough to meet the needs of the body. It is sometimes called congestive heart failure because congestion of the lungs is one of the main symptoms of this disease
Cardiac-Arrest When the heart stops beating
Heart Attack When the heart muscles are suddenly damaged by an inadequate blood supply

195 **(b)**
Haemoglobin molecule is made up of two α-chains, which have 141 amino acids and two β–chains with 146 amino acids each.

196 **(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.

197 **(a)**
Autoexcitable nodes are the specialised cardiac muscle fibres of the nodal tissue

198 **(b)**
Another antigen, the Rh antigen similar to the one present in Rhesus monkey (Hence, Rh), is also observed on the surface of RBCs of majority (nearly 80%) of humans. Such individuals are called Rh positive (Rh^+) and those in whom this antigen is absent are called Rh negative (Rh^-)

199 **(a)**
A-Nodal Tissue, B-SAN, C-AVN. The nodal musculature has the ability to generate action potentials without any external stimuli

200 **(d)**
In open circulatory system instead of capillaries, blood vessels join directly with the open sinuses. Blood is actually a combination of blood and interstitial fluid called haemolymph which is

forced from the blood vessels into the large sinuses, where it actually, baths the internal organs.

Open Circulatory System	Closed Circulatory System
Blood flows in the open tissue spaces.	Blood flows in the closed tubes.
Blood is in direct contact with the tissue cells.	Blood does not come in direct contact with tissue cells.
Exchange of material directly between the blood and tissue cells.	Exchange of material between tissue cells and blood occurs *via* tissue fluid.
Blood flow is slow.	Blood flow is rapid.
Blood has very low pressure.	Blood pressure is high.

201 **(b)**
Lymph can be defined 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.

202 **(a)**
Subsequent normal pregnancies of Rh^+ husband and Rh^- wife could be possibly by administrating anti-Rh antibody to the mother just after the birth of child.
Vaccine (RHO GAM) are available to prevent erythroblastosis foetalis

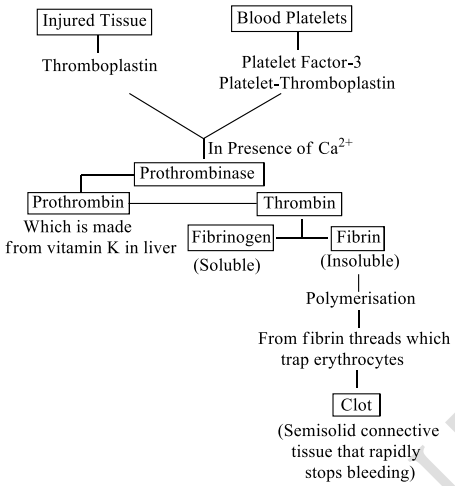
203 **(d)**
Fibrinogen, globulin and albumin are the major proteins present in the human blood. Fibrinogens are needed for clotting or coagulation of the blood. Globulin is primarily involved in the defense mechanism of the body and albumin helps in maintaining the osmotic balance

204 **(b)**
Spleen serves as a sort of blood bank, the sinuses of spleen act as 'reservoirs of blood'.

205 **(b)**
Mac Ferlane.
According to the Cascade theory (given by Mac Ferlane), 13 factors are required in the process of blood clotting

206 **(b)**
A-70, B-30. Each cardiac cycle is initiated by spontaneous generation of an action potential is the sinous node

207 **(a)**
Ca^{2+}.
By the traumatised cell at the place of injury



208 **(b)**
Each subclavian artery of rabbit branches off into vertebral artery, internal mammary artery and branchial artery. Internal mammary artery taking blood to mammary gland and pericardium.

209 **(a)**
A special case of Rh incompatibility has been observed between Rh −ve blood of pregnant mother with Rh +ve blood of foetus. During the delivery of the first child there is a possibility of exposure of the maternal blood to small amount of Rh +ve blood from foetus.
In such cases, the mother starts preparing antibodies against Rh antigen in her blood. In the case of her subsequent pregnancies, the Rh antibody from the mother can leak to blood of foetus and destroy foetal RBC. This could be fatal to foetus or could cause severe anaemia and jaundice to the foetus. This condition in called erythroblastosis foetalis

210 **(a)**
Sulphur oxides cause membrane damage, metabolic inhibition and reduction in growth and yield. SO_2 above 1 ppm affects human beings. It causes irritation to eye and injury to respiratory tract.

211 **(c)**
Fluid part of blood after removal of corpuscles is plasma. Prothrombin and fibrinogen of plasma are essential for blood clotting. Blood plasma minus clot results in serum which is a pale yellow fluid.

212 **(b)**
Granulocytes and agranulocyte are the categories of WBC

213 **(c)**
Systolic blood pressure = 120 mm Hg
Diastolic blood pressure = 80 mm Hg

∴Difference between systolic and diastolic blood pressure

= 120 - 80 = 40 mm Hg

214 **(c)**

80 mm of Hg.

High Blood Pressure (hypertension) is the term for blood pressure that is higher than normal (120/80). In this measurement 120 mm of Hg (millimeters of mercury pressure) is systolic or pumping, pressure and 80 mm of Hg is diastolic or resting pressure

215 **(d)**

High Blood Pressure (hypertension) is the term for blood pressure that is higher than normal (120/80). In this measurement 120 mm of Hg (millimeters of mercury pressure) is systolic or pumping, pressure and 80 mm of Hg is diastolic or resting pressure

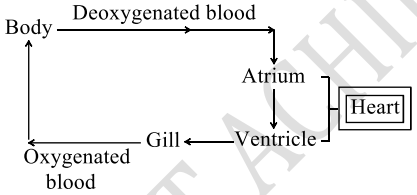
216 **(c)**

Average life of RBC is 120 days after which they are broken down in spleen or liver. Product of breakdown of haemoglobin is a pigment (yellow colour) called bilirubin which is normally disposed off through the bile. Whereas, haeme is transferred to bone marrow. Retention of bilirubin leads to jaundice

217 **(c)**

According to the Cascade theory (given by Mac Ferlane), 13 factors are required in the process of blood clotting

218 **(a)**



This circulation clearly indicates that there is single atrium and ventricle. So it is the circulation of fishes

219 **(a)**

Diagram-*A* As we can see, there is closure of bicuspid and tricuspid valve, it clearly indicates that the blood is coming into the atrium which means they are in the relaxed or diastole position.

Diagram-*B* As in this diagram, bicuspid and tricuspid valves are open and blood goes from the atrium to ventricle, it clearly indicates that there is contraction of atrium. This situation is called atrial systole.

Diagram-*C* In this diagram, the semilunar valves are open means the blood is going to pulmonary artery and aorta respectively. This happens only when there is contraction in the ventricles. This situation is called ventricular systole

220 **(c)**

Facultative heterochromatin (Barr body) found in females actually are neutrophils. They are drum stick-shaped

Agranulocytes are not found in the cytoplasm. They are formed in the bone marrow and thymus

Granulocytes They are found in the cytoplasm. They are produced in the red bone marrow

221 **(c)**

Three semilunar valves are located at the base of pulmonary trunk and aorta and tricuspid valves guard right atrio ventricular opening.

222 **(d)**

Plasma constitute 55 to 60% of blood volume. Minerals are also present in blood

223 **(c)**

Number of oxygen molecule = Number of haemoglobin One haemoglobin bind to = 4 oxygen molecule.

Then one fourth of haemoglobin bind to all oxygen molecules and 3/4th haemoglobin molecule remains vacant

224 **(c)**

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

225 **(b)**

Sinu-auricular Node (SA-node) or pacemaker is found in right auricle of heart. This initiates heart beat.

226 **(d)**

The myocardium (wall) of left ventricle is three times thicker than right ventricle. This is because the ventricles pumps out blood with force away from heart, the right one to pulmonary artery and the left one to aorta.

227 **(c)**

Lymph can be defined as blood minus RBCs. Lymph is a clear, colourless fluid, similar to plasma but with less protein. It is a mobile connective tissue like, blood and is formed by the filtration of blood. Microscopic examination of lymph depicts that it contains a large number of leucocytes (mostly lymphocytes). No blood platelets present.

228 **(d)**
Parasympathetic neural signals (another component of ANS) decreases the rate of heartbeat, speed of conduction of action potential and thereby cardiac output

230 **(a)**
The partial pressure of oxygen in blood capillary is higher (95 mm Hg) than that of the body cells (40 mm Hg) and the partial pressure of carbon dioxide is lesser (40 mm Hg) than that of the body cells (45 mm Hg). Therefore, oxygen diffuses from the capillary blood to the body cells through tissue fluid and carbon dioxide diffuses from the body cells of the capillary blood *via* tissue fluid.

231 **(b)**
RBCs of mammals are round, biconcave and without nucleus, mitochondria, Golgi body, centrosomes etc. These cell organelles lose during development (reticulocyte stage).

232 **(d)**
None of these.
Lymph is a colourless fluid containing specialised lymphocytes (B and T cells) which are responsible for the immune response of the body. Lymph is also an important carrier for nutrients and hormones, etc. Fats are absorbed by the lymph in the lacteals present in the intestinal villi. This interstitial fluid is called the tissue fluid or lymph, which plays an important role in immunity against disease. It the has same mineral distribution as that of the plasma

233 **(b)**
The main inorganic constitutents of blood plasma are chloride and bicarbonate salts of sodium (principal cation). Traces of some other salts like phosphates, bicarbonates, sulphates and iodides of calcium, magnesium and potassium are also found.

234 **(b)**
II, III, IV

235 **(b)**
Fluid part of the blood after the removal of corpuscles is called plasma. Blood plasma minus clot results in the formation of serum which is a pale yellow fluid

236 **(a)**
Annelids and chordates.
Circulatory patterns are two types
Open Circulatory Pathways
Present in arthropods and molluscs in which the blood pumped by the heart passes through the large vessels into the open spaces of body cavity called sinuses
Closed Circulatory Pathways
Annelids and chordates have closed circulatory system in which the blood pumped by the heart is always circulated through a closed network of blood vessels. This pattern is considered to be more advantageous as the flow of fluid can be more precisely regulated

237 **(b)**
The murmur sound indicates the defective heart valves.

238 **(d)**
Pulmonary aorta arises from right ventricle and supplies deoxygenated blood from heart to lungs.

239 **(a)**
Portal system is a part of venous circulation, which is present between two groups of capillaries, *i. e.*, starts in capillaries and ends in capillaries. The vein which drains blood into organs other than heart is called portal vein

240 **(b)**
The papillary muscles are attached to the lower portion of the interior wall of the ventricles. They connect to the chordae tendinae, which attach to the tricuspid valve in the right ventricle and the mitral valve in the left ventricle. The contraction of the papillary muscles opens these valves, when the papillary muscles relax, the valves close.

241 **(a)**
Cardiac cycle is the cyclic events occur in single heart beat. It involves repeated countraction (when blood is ejected from heart called systole) and relaxation (when the chambers of the heart are filled with blood called diastole) of the muscle fibre of heart. During a cardiac cycle, each ventricle pumps out approximately 70 mL of blood which is called stroke volume.

242 **(c)**
Coronary Artery Disease (CAD) is characterized by hardening and loss of elasticity of the arteries.

243 **(c)**
The lateral pressure exerted by the column of blood on the wall of the blood vessels in which, it is present is called blood pressure. It is usually measured in brachial artery by an instrument, called sphygmomanometer. It measures both systolic as well diastolic blood pressure.

244 **(b)**
Myogenic heart beat is initiated in the hearts of molluscs and vertebrates.

245 **(c)**
Blood is a liquid, mobile connective tissue consisting of fluid matrix, plasma and formed elements

246 **(b)**
SA node is called the pacemaker of the heart (not pace keeper) because it is the site at, which the initiation of the contraction originates

247 **(b)**
A-O_2, B-tissues, C-CO_2

248 **(a)**
ECG is the graphical recording of electrical changes that accompany the cardiac cycle. It is represented by five waves – P, Q, R, S and T. P-wave indicates depolarization, of atria, QRS complex indicates ventricular depolarization, while T-wave indicates ventricular repolarization.

249 **(d)**
The lymphatic ducts of left side unite to form a thoracic duct. This duct begins at the cistern chyli, which is sac-dilation situated in front of the first and second lumbar vertebrae. The thoracic duct has several valves. It discharges its lymph into the left subclavian vein.
The lymphatic ducts of right side unite to form right thoracic duct, which discharge its lymph into the right subclavian vein.

250 **(b)**
A-muscular chambered heart, B-2, C-3, D-4

251 **(a)**
V → III → I → IV → II

252 **(b)**
Carotico systemic aorta arises from left ventricle. It forms the carotic systemic arch of left side. Each arch or aorta has three cup like semilunar valves to prevent the back flow of blood from the arch into the ventricle.

253 **(b)**
G-6-P dehydrogenase deficiency is associated with haemolysis of RBCs.

254 **(b)**
Blood flowing from the lung to the heart through the pulmonary vein is rich in O_2. Due to O_2, its colour appears bright red rather than dark

255 **(d)**
All of the above.
Process of RBC formation is known as erythropoiesis. Iron, vitamin-B_{12} and folate are essential for RBC production. Erythropoiesis is completed in 72 hours. Erythropoietic organs in foetus are liver, lymph nodes and spleen. Whereas after birth, erythropoietic tissue is red bone marrow

256 **(d)**
Rh negative person if exposed to Rh positive blood, the person will form specific antibodies against the Rh antigen. Therefore, Rh group should also be matched before transfusion

257 **(a)**
SA-node (sino-atrial node) is a group of specialized cardiac muscle cells, which have the property of generating rhythmic excitatory waves. It is also called pacemaker of the heart as it generates the wave for all the chambers of heart to contact.

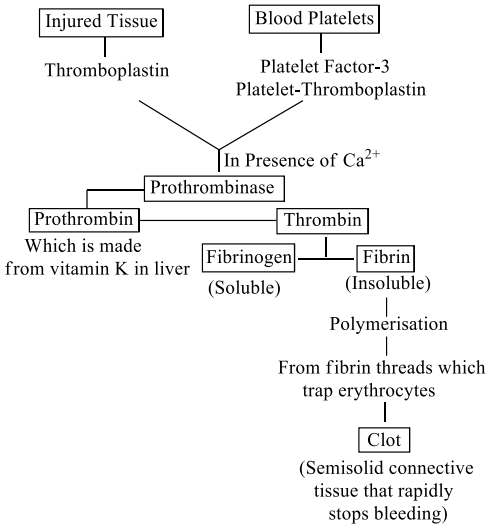
258 **(c)**
This is the same case of giving birth to Rh^+ child whose father is Rh^+ and mother is Rh^-

259 **(d)**
Foetus have severe anaemia and jaundice.
A special case of Rh incompatibility has been observed between Rh −ve blood of pregnant mother with Rh +ve blood of foetus. During the delivery of the first child there is a possibility of exposure of the maternal blood to small amount of Rh +ve blood from foetus.
In such cases, the mother starts preparing antibodies against Rh antigen in her blood. In the case of her subsequent pregnancies, the Rh antibody from the mother can leak to blood of foetus and destroy foetal RBC. This could be fatal to foetus or could cause severe anaemia and jaundice to the foetus. This condition in called erythroblastosis foetalis

260 **(a)**
At height above 8000 m from sea level, the partial pressure of oxygen in air is decreased. As a result, less haemoglobin is formed and the person suffers from dizziness, breathlessness, etc. This is called mountain sickness. A continuous exposure to this height increases ventilation to about 3 to 7 times than normal by significant increase in RBCs count and haemoglobin content in blood and breathing becomes normal.

261 **(b)**
Human RBCs remains functional in blood for about 120 days. Their pigment is degraded to yellowish pigment, bilirubin which is excreted in bile

262 **(d)**
None of the above.
By the traumatised cell at the place of injury



263 **(d)**
The oxygenated and deoxygenated blood are forced into their respective ventricles through atrioventricular opening by the contraction of atria. The contraction of atria is initiated and activated by the sinoatrial node (SA node) commonly called pacemaker. It spreads waves of contraction across the walls of atria *via* muscle fibres at regular intervals.

264 **(b)**
Joint relaxation happens in the isometric relaxation. In this phase, all the valves are closed and atria and ventricles are in relaxed state

265 **(a)**
pH is a measure of the concentration of hydrogen ions in a solution. Blood is a kind of fluid connective tissue. Blood is slightly alkaline having an average pH 7.4. It is made up of blood cells (RBCs, WBCs, etc) and blood plasma.

266 **(a)**
Hypertension is persistent high blood pressure with systolic pressure more than 140 mm Hg and diastolic pressure more than 90 mm Hg. It is caused by decrease in extensibility of the artery due to artherosclerosis and arteriosclerosis. Sclerosis means hardening and narrowing of blood vessels.

267 **(b)**
Lymph is a colourless fluid containing specialised lymphocytes (B and T cells) which are responsible for the immune response of the body. Lymph is also an important carrier for nutrients and hormones, etc. Fats are absorbed by the lymph in the lacteals present in the intestinal villi

268 **(a)**
The cycle of events which occur in a single heart beat is called cardiac cycle. It involves contraction and relaxation of the heart muscle
Systole When blood is ejected from the heart contraction
Diastole When chambers of the heart are filled with the blood. It is also called relaxation

269 **(b)**
Diabetes insipidus is caused due to hyposecretion of **anti diuretic hormone**. It controls reabsorption of water in DCT in kidney.
Decrease in blood sugar level is known as hypoglycemia. Increase in blood sugar level (hyperglycemia), so much that it is excreted in the urine is the condition known as diabetes mellitus.

270 **(b)**
Camel is a mammal, only it has oval-shaped RBCs, which also contain nucleus and other cells organelles at maturity.

271 **(b)**
Lymph has only white blood cells (WBCs) so the colour of lymph is white (RBCs are not present in lymph), while blood has RBCs, WBCs, blood plasma and platelets.

272 **(b)**
All reptiles have three-chambered heart containing two atrium (left and right) and one ventricle. These is a single ventricle and so mixing of oxygenated and deoxygenated blood occurs. But in crocodile, which is an exception have four-chambered heart

273 **(a)**
SA-node is located in the right atrial wall below the opening of the superior vena cava. It initiates each cardiac cycle and thereby sets the basic pace of the heart beat, hence, its name is 'pacemaker' or 'heart of heart'.

274 **(c)**
The pacemaker creates the rhythmical impulse normally made by SA (sinu-atrial) node. Hence, it is implanted at the site of SA-node to mimic the action and to regulate the heart beat. SA-node is found in the upper part of the right atrium of the heart. It is a specialized bundle of neurons (nerve cells).

275 **(d)**
During working of heart, two sounds are produced lubb and dup. First sound (*i. e.*, lubb) is produced, when auriculoventricular (tricuspid and bicuspid) valves are closed or at the end of diastole. The second sound (*i. e.*, dup) is produced when semilunar valves at the base of dorsal aorta are closed or at the end of systole.

277 **(c)**

Circulatory patterns are two types

Open Circulatory Pathways

Present in arthropods and molluscs in which the blood pumped by the heart passes through the large vessels into the open spaces of body cavity called sinuses

Closed Circulatory Pathways

Annelids and chordates have closed circulatory system in which the blood pumped by the heart is always circulated through a closed network of blood vessels. This pattern is considered to be more advantageous as the flow of fluid can be more precisely regulated

278 **(b)**

By counting the numbers of QRS complexes that occur in a given time period, one can determine the heart beat rate of an individual. Since the ECGs is obtained from different individuals have roughly the same shape for a given lead configuration, any deviation from this shape indicates a possible abnormality or disease. Hence it is of great clinical significance

279 **(a)**

A special neural centre in medulla oblongata can moderate the cardiac function through Autonomic Nervous System (ANS). Medulla oblongata is called the cardiac centre

280 **(a)**

Carbonic anhydrase is an enzyme present in the red blood corpuscles (erythrocytes) of blood. It has a role during CO_2 transportation in plasma. Most of CO_2 produced by tissues diffuses passively into the blood plasma and reacts with water forming carbonic acid. This reaction occurs very rapidly inside RBCs because of the presence of enzyme **carbonic anhydrase**.

281 **(d)**

Pacemaker is an electric device connected to heart for covering up any deficiency of myogenic functioning so as to make it beat normally. It consists a pulse generator having long lasting lithium halide battery and muscle stimulating electrodes.

282 **(a)**

Plasma is a faint yellow, slightly alkaline viscous fluid. It consists of about 90% water, 1% inorganic salts. 6-8% proteins and it constitutes of about 55% of the blood

283 **(d)**

Coronary Circulation Circulation of the blood in the heart muscle is called coronary circulation. Coronary heart diseases occur due to the insufficient blood supply to the heart muscles

284 **(c)**

SA-node is also called as pacemaker or heart, pulsation centre. It is located in the right wall of right atrium below the opening of superior vena cava. SA-node is the main tissue of heart and has highest degree of autorhythmicity. SA-node initiates and regulates the speed of heart beat.

285 **(a)**

Diagram A = Ventricular systole
Diagram B = Atrial diastole
Diagram C = Ventricular diastole

286 **(b)**

III, IV, I, II.

According to the Cascade theory (given by Mac Ferlane), 13 factors are required in the process of blood clotting

287 **(a)**

Blood = Plasma + RBCs + WBCs + Blood platelets.

288 **(b)**

In case, when SA-node or the pacemaker is non-functional then, there will no origin of heart beat and there will no transmission of impulses to atria. The ventricle fails to receive atrial impulse by obstruction in AV conduction. Thus, overall conducting system of heart is disrupted.

290 **(b)**

The concentration of lead in blood averages about 25 μg/100 mL. Increase to 70 μg/100 mL is generally associated with clinical symptoms. Hence, a level of 30 μg/100 mL is considered alarming.

291 **(a)**

Systolic blood pressure is developed at the time of ventriculo-systole. It is also known as higher blood pressure or higher limit of arterial blood pressure (*i. e*., 120 mm Hg). Diastolic pressure is known as lower limit of blood pressure (*i. e*., 80 mm Hg).

292 **(a)**

Bundle of His.

Auto-Rhythmicity of Heart

Automatic rhythmicity of the heart is the ability to contract spontaneously. Mammalian heart is myogenic. It means heart beat results from a wave of electrical potential called cardiac impulse arising from sinoatrial node SA node and spreading over cardiac chambers.

SA-node lies in the wall of right atrium near opening of superior vena cava and contract about 72 times per minute. Form SA node cardiac impulse travels to atrioventricular node (lies between right atrium and ventricle)
Then pass to AV bundle (also called bundle to His) and its branches reaches to the Purkinje fibres in ventricles.
Bundle of His provides the only route for the transmission of wave of excitation from atria to ventricles. Purkinje fibres conducts the impulses five times more rapidly than surrounding cells. It forms a pathway for conduction of impulse that ensures that the heart muscle contracts in the most efficient manner

293 **(c)**
More than 20 different blood group systems are recognised in medicine. Out of which, the best known are ABO system and Rh system.
In 1900, Dr. Karl Landsteiner discovered the ABO blood groups and 1902 Rh was found by Decastello and Sturll

294 **(b)**
ECG or EKG (electrocardiogram) is a record of difference in electric potential during the working of heart.

295 **(b)**
Neutrophils stain equally well with both basic and acidic dyes

296 **(a)**
A-plasma, B-inactive, C-serum

Blood Plasma	Blood Serum
(i) Fluid portion of the blood in the form of matrix	Fluid collected after the clot reaction
(ii) Has fibrinogen and other clotting material	Does not have fibrinogen and other clotting material
(iii) Takes part in blood clotting	Don't take part in blood clotting
(iv) It is straw coloured clear liquid	It is pale yellow in colour

297 **(a)**
ABO blood grouping is based on the presence or absence of the surface antigens, A and B on RBCs

298 **(b)**
Rh positive (+ ve).
Blood platelets occur only in mammals. They are non-nucleated, round or oval biconvex and bud from megakaryocytes. They are much smaller than RBC. Blood platelets are the source of thromboplastin, necessary for blood clotting

299 **(a)**
Only I.
Lymph can be defined as the blood minus RBCs. Lymph is a clear, colourless fluid similar to plasma, but with less protein. It is a mobile connective tissue like, blood and is formed by the filtration of blood. Microscopic examination of the lymph depicts that it contains a large number of lymphocytes. No blood platelets are present is it
Lymph is a colourless fluid containing specialised lymphocytes (B and T cells) which are responsible for the immune response of the body. Lymph is also an important carrier for nutrients and hormones, etc. Fats are absorbed by the lymph in the lacteals present in the intestinal villi

300 **(a)**
Blood Platelets occur only in mammals. They are non-nucleated and colourless. They bud off from the megakaryocytic cells of red bone marrow. That's why they are called blood platelets or cell fragments. They have thromboplastin necessary for blood clotting

301 **(c)**
Due to the absence of Rh antibodies in mother's blood.
A special case of Rh incompatibility has been observed between Rh −ve blood of pregnant mother with Rh +ve blood of foetus. During the delivery of the first child there is a possibility of exposure of the maternal blood to small amount of Rh +ve blood from foetus.
In such cases, the mother starts preparing antibodies against Rh antigen in her blood. In the case of her subsequent pregnancies, the Rh antibody from the mother can leak to blood of foetus and destroy foetal RBC. This could be fatal to foetus or could cause severe anaemia and jaundice to the foetus. This condition in called erythroblastosis foetalis

302 **(a)**
The chordae tendinae or heart strings are cord-like tendons that connect the papillary muscles to the tricuspid valve and the mitral valve in the heart. The chordae tendinae prevents the flaps from being everted upto the right atrium, these cord like tendons hold in position other flaps, such as bicuspid or mitral valve.

303 **(a)**
Complete Circulation

When there is complete separation of oxygenated and deoxygenated blood in the heart, it is called complete circulation, *e*. *g*., birds and mammals

Incomplete Circulation

When there is mixing of oxygenated and deoxygenated blood in the circulation *via* heart. This happens due to the absence of separate chambers in the heart for oxygenated and deoxygenated blood, *e*. *g*., amphibian, reptile and fishes

304 **(a)**

The bundle of His, known as AV bundle (atrio ventricular bundle) is a collection of heart muscle cells specialized for electrical conduction. These specialized muscle fibres in the heart were named after the Swiss cardiologist **Wilhelm His Jr.,** who discovered them in 1893.