

## Botany - Section A

1.

In the citric acid cycle, a molecule of GTP is formed during the conversion of:

1.  $\alpha$  - ketoglutarate to Succinyl-CoA
2. Succinyl-CoA to succinate
3. Succinate to fumarate
4. Fumarate to malate

2.

Match the scientists given in Column I with their contribution in understanding the process of photosynthesis in Column II and select the correct answer from the codes given below:

	<b>COLUMN I</b>		<b>COLUMN II</b>
A.	Jan Ingenhousz	a.	Only green parts of the plant are capable of photosynthesis
B.	F. F. Blackman	b.	Enzymes must carry out the light independent reaction
C.	C. B. van Neil	c.	Oxygen comes from water and not from carbon dioxide
D.	T. W. Engelman	d.	First action spectrum of photosynthesis

Codes

- A B C D
1. a b c d
  2. b a d c
  3. a b d c
  4. b a c d

3.

Identify the incorrect comparison between  $C_3$  and  $C_4$  photosynthetic plants:

	<b>Characteristic</b>	<b><math>C_3</math> plants</b>	<b><math>C_4</math> plants</b>
1.	Chloroplasts	One type [only granal]	Two types [granal and agranal]
2.	Photorespiration	High	Negligible
3.	First $CO_2$ fixation product	3-PGA	OAA
4.	Carboxylase enzyme	Only Rubisco	Only PEPcase

4.

Identify the correct statements amongst the following:  
 I. Auxins and cytokinins act antagonistically in regulating axillary bud growth  
 II. Gibberellins act in concert with auxin to promote stem elongation  
 III. In most situations, Abscisic acid acts as an antagonist to gibberellins.

1. I and II only
2. I and III only
3. II and III only
4. I, II and III

5.

How many molecules of ATP are directly synthesized in the glycolysis pathway from one glucose molecule?

1. 2
2. 4
3. 6
4. 10

6.

Identify the plant growth regulator that is not correctly matched to its chemical nature in the following given options:

	<b>PGR</b>	<b>Chemical nature</b>
1.	Ethylene	Gaseous
2.	Adenine derivatives	Kinetin
3.	Indole compounds	Auxins
4.	Terpenes	Abscisic acid

7.

In cyclic photophosphorylation, the primary electron acceptor is:

1. Iron-sulfur protein
2. Ferredoxin
3. Plastocyanin
4. Pheophytin

8.

The electron transport system [ETS] in mitochondria is present in:

1. The outer membrane
2. The inner membrane
3. Inter-membrane space
4. Matrix

9.

If the chloroplasts are illuminated by sunlight, where do you expect to find the pH to be lowest?

1. Stroma
2. Intermembrane space [between outer and inner membranes]
3. Space enclosed by thylakoid membranes
4. Cytosol

10.

Consider the two statements:

I. The  $C_4$  photosynthesis pathway uses more energy than the  $C_3$  photosynthesis pathway.

II.  $C_4$  plants are able to more efficiently fix carbon in drought, high temperatures, and limitations of nitrogen or  $CO_2$ .

1. Both I and II are correct and II explains I
2. Both I and II are correct but II does not explain I
3. Only I is correct
4. Both I and II are incorrect

11.

For aerobic cellular respiration, identify the correctly matched row:

	<b>Phase</b>	<b>Cost, per glucose</b>	<b>Gain, per glucose</b>
1.	Glycolysis	2 ATP	4 ATP, 1 NADH
2.	Oxidation of pyruvic acid	4 ATP	2 NADH
3.	Kreb's cycle	2 ATP	2 ATP, 6 NADH,
4.	Electron transport	2 ATP	34 ATP

12.

Parthenocarpy in tomato plants can be induced by:

1. Auxins
2. Gibberellins
3. ABA
4. Cytokinins

13. What would be true for cyclic photophosphorylation in photosynthetic plants?
1. It utilizes excess ATP.
  2. It reduces  $\text{NADP}^+$  to NADPH.
  3. It occurs in the cytochrome bf complex and utilizes electrons from photosystem I.
  4. It utilizes electrons from photosystem II.
14. Cyanide is a deadly poison as causes the electron transport system in mitochondria to stop because it forms a complex with:
1. NADH dehydrogenase
  2. ATP synthase
  3. Cytochrome a3
  4. Succinate dehydrogenase
15. The enzyme hexokinase catalyzes:
- I. hydrolysis of sucrose to glucose and fructose
  - II. phosphorylation of glucose to glucose 6 phosphate
  - III. phosphorylation of fructose to fructose 6 phosphate
1. Only II
  2. Only I
  3. Both II and III
  4. I, II and III
16. In the step of the glycolytic pathway where  $\text{NADH} + \text{H}^+$  is formed:
- I. Two redox equivalents are removed from PGAL and transferred to a molecule of  $\text{NAD}^+$
  - II. PGAL is oxidized and gets converted into BPGA
1. Only I is correct
  2. Only II is correct
  3. Both I and II are correct
  4. Both I and II are incorrect
17. In both lactic acid and alcohol fermentation:
1. less than 4 percent of the energy in glucose is released and all of it is trapped as high energy bonds of ATP
  2. less than 4 percent of the energy in glucose is released and not all of it is trapped as high energy bonds of ATP
  3. less than 7 percent of the energy in glucose is released and all of it is trapped as high energy bonds of ATP
  4. less than 7 percent of the energy in glucose is released and not all of it is trapped as high energy bonds of ATP
18. What is incorrect regarding the reaction catalyzed by the enzyme pyruvate dehydrogenase in cellular respiration?
1. It takes place in the mitochondrial matrix
  2. Cofactors required by the enzyme are zinc ions
  3. It leads to oxidative decarboxylation of pyruvate
  4. It requires participation of  $\text{NAD}^+$  and Coenzyme A
19. There are three points in the citric acid cycle where  $\text{NAD}^+$  is reduced to  $\text{NADH} + \text{H}^+$ . Identify the one which is not:
1. Isocitrate to alpha ketoglutarate
  2. Alpha ketoglutarate to Succinyl-CoA
  3. Succinate to fumarate
  4. Malate to oxaloacetate
20. Glucose enters the glycolytic pathway in the cytosol. Which of the following is not a correct number of molecules produced from the breakdown of this glucose molecule by the time the Krebs cycle has been completed?
1.  $8 \text{ NADH} + \text{H}^+$
  2.  $6 \text{ CO}_2$
  3.  $2 \text{ FADH}_2$
  4. 6 ATP

21.

NADH initially binds to the complex I of the mitochondrial electron transport chains and transfers two electron first to:

1. FMN
2. Fe-S clusters
3. Ubiquinone
4. Complex II

22.

The only enzyme that participates in both the citric acid cycle and the electron transport chain is the:

1. NADH dehydrogenase
2. Succinate dehydrogenase
3. Cytochrome c oxidase
4. ATP synthase

23.

What is incorrect about the  $F_1$  headpiece of the ATP synthase [complex V of mitochondrial electron transport chain]?

1. It is hydrophilic
2. It is a peripheral membrane protein complex.
3. It contains the catalytic site for the synthesis of ATP
4. It protrudes into the inter-membrane space of mitochondria

24.

The following table compares breakdown of glucose by fermentation and aerobic respiration.

	<b>Fermentation</b>	<b>Aerobic respiration</b>
Extent of breakdown of glucose	Partial	Complete
Gain of ATP molecules	Very few	Much more
Oxidation of NADH	Vigorous	Slow

The correct comparisons include:

1. Only I and II
2. Only I and III
3. Only II and III
4. I, II and III

25.

When purely used as respiratory substrates, the respiratory quotient is expected to be the least for:

1. Carbohydrates
2. Proteins
3. Organic acids
4. Fatty acids

26.

Oxygen evolved by green plants during photosynthesis comes from:

1. Water
2. Carbon dioxide
3. Glucose
4. Sucrose

27.

The biological function of photorespiration is:

1. Production of ATP
2. Production of NADH
3. Regeneration of  $NAD^+$
4. Not known yet

28.

Calvin cycle occurs in:

1. C<sub>3</sub> plants and C<sub>4</sub> plants but not in CAM plants
2. Only C<sub>3</sub> plants and not in C<sub>4</sub> plants and CAM plants
3. C<sub>3</sub> plants and CAM plants but not in C<sub>4</sub> plants
4. All photosynthetic plants

29.

The mitochondrial process similar to photophosphorylation in chloroplast is:

1. Substrate level phosphorylation
2. Oxidative phosphorylation
3. Oxidative decarboxylation
4. Hydrolysis

30.

What colors of light work best for photosynthesis?

1. Green
2. Violet and Yellow
3. Blue and red
4. Yellow

31.

The photosynthetic pigment in plant cells are located in the:

1. mitochondria
2. cytoplasm of the cell
3. stroma of the chloroplast
4. thylakoid membrane of the chloroplast

32.

The relationship between incident light and carbon dioxide fixation rates by green plants at low light intensities is:

1. linear
2. sinusoidal
3. hyperbola
4. parabola

33.

Skoog and Miller are credited with the discovery of:

1. Gibberellins
2. Auxins
3. Cytokinins
4. Ethylene

34.

Which PGR is called as the 'stress hormone'?

1. Ethylene
2. ABA
3. GA<sub>3</sub>
4. IAA

35.

The PGR that helps in overcoming the apical dominance is:

1. Auxins
2. Cytokinins
3. Gibberellins
4. ABA

## Botany - Section B

36.

Identify the incorrectly matched pair:

- |    |   |                |
|----|---|----------------|
| 1. | Main sugar in phloem sap                                  | Sucrose        |
| 2. | Form in which most nitrogen is transported by xylem       | Inorganic ions |
| 3. | Element not remobilized in plants                         | Calcium        |
| 4. | Transport mechanism by which most minerals enter the root | Active         |

37.

Control point where a plant adjusts the quantity and types of solutes that reach the xylem is:

1. Casparian strips in the endodermis
2. Sclerenchyma in the pericycle
3. Transport proteins of endodermal cells
4. Companion cells in the phloem

38. The activator for both RuBisCO and PEPCase is:  
 1.  $Zn^{2+}$   
 2. Mo  
 3.  $Ca^{2+}$   
 4.  $Mg^{2+}$
39. Nitrogen fixing nodules on the roots of *Alnus* are produced by:  
 1. *Frankia*  
 2. *Rhizobium*  
 3. *Anabaena*  
 4. *Rhodospirillum*
40. Which of the following can generally be called as 'open' in plants?  
 I. Growth  
 II. Differentiation  
 1. Only I  
 2. Only II  
 3. Both I and II  
 4. Neither I nor II
41. The action spectrum of photosynthesis was first described by:  
 1. T. W. Engelmann  
 2. Julius von Sachs  
 3. Joseph Priestley  
 4. Jan Ingenhousz
42. The reaction centers chlorophyll a of PSI and PSII have an absorption peak respectively at:  
 1. 680 nm and 700 nm  
 2. 630 nm and 730 nm  
 3. 730 nm and 630 nm  
 4. 700 nm and 680 nm
43. Fixation of carbon dioxide by CAM pathway will be seen in:  
 1. Cactus  
 2. Maize  
 3. *Polysiphonia*  
 4. *Sorghum*
44. The current availability of carbon dioxide in the atmosphere is limiting to:  
 1.  $C_3$  plants  
 2.  $C_4$  plants  
 3. Both  $C_3$  and  $C_4$  plants  
 4. Neither  $C_3$  nor  $C_4$  plants
45. In lactic acid fermentation, the final electron acceptor is:  
 1. Oxygen  
 2. Lactic acid  
 3. Pyruvate  
 4.  $NAD^+$
46. During aerobic cellular respiration most carbon dioxide is produced during:  
 1. Glycolysis  
 2. Oxidation of pyruvate  
 3. Citric acid cycle  
 4. Chemiosmosis
47. Glycerol will enter the respiratory pathway after being converted into:  
 1. Acetyl CoA  
 2. PGAL  
 3.  $\alpha$  Ketoglutarate  
 4. PEP

48.

The PGR used to speed up the malting process in brewing industry is:

1. Auxin
2. Cytokinin
3. Ethylene
4. Gibberellin

49.

Seed dormancy due to presence of chemical inhibitors can be overcome by application of:

1. Mechanical abrasion of seed coat
2. Phenolic acid and PABA
3. Subjecting seeds to chilling conditions
4. Vigorous shaking

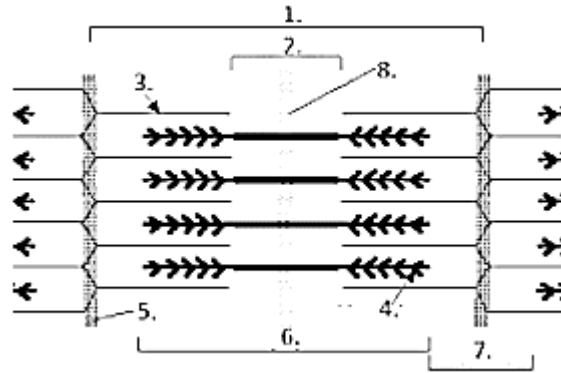
50.

Respiratory climatic is due to:

1. Ethylene
2. ABA
3. IAA
4. GA<sub>3</sub>

53.

The given diagram shows the arrangement of myofilaments on the myofibril in a skeletal muscle. During muscle contraction the part that does not change in length is labeled as:



1. 1
2. 2
3. 6
4. 7

## Zoology - Section A

51.

An excessive loss of fluid from the body can activate the osmoreceptors leading to the secretion of:

1. Angiotensinogen from the liver
2. ADH from the hypothalamus
3. Renin from the juxtaglomerular cells
4. Aldosterone from the adrenal cortex

52.

Tetany is caused by:

1. low levels of Ca<sup>++</sup> in body fluids
2. high levels of Ca<sup>++</sup> in body fluids
3. low levels of K<sup>+</sup> in body fluids
4. high levels of K<sup>+</sup> in body fluids

54.

Match the parts of the nephron in Column I with function/feature in Column II and select the answer from the codes given:

COLUMN I	COLUMN II
A. PCT	a. Maximum reabsorption of water and electrolytes
B. Loop of Henle - descending limb	b. Permeable to water but almost impermeable to electrolytes
C. Loop of Henle - ascending limb	c. Impermeable to water but permeable to electrolytes
D. DCT	d. Conditional reabsorption of Na <sup>+</sup> and water

- Codes  
A B C D  
1. a b c d  
2. b a d c  
3. a b d c  
4. b a c d

55.

Match the parts of the human brain in Column I with function in Column II and select the answer from the codes given:

COLUMN I	COLUMN II
A. Medulla oblongata	a. Coordinating center for sensory and motor signaling
B. Thalamus	b. Regulation of gastric secretions
C. Hypothalamus	c. Thermoregulation and osmoregulation
D. Hippocampus	d. Consolidation of short term memory into long term memory

- Codes  
A B C D  
1. a b c d  
2. b a d c  
3. a b d c  
4. b a c d

56.

Identify the incorrect statement:

1. Neutrophils and monocytes are main phagocytic cells
2. Eosinophils and basophils are involved in allergic reactions
3. B and T lymphocytes are responsible for adaptive [acquired] immunity
4. Neutrophils are the commonest and eosinophils are the rarest WBCs

57.

Which gastrointestinal hormone acts on the exocrine pancreas and stimulates secretion of water and bicarbonate ions?

1. Gastrin
2. Secretin
3. Cholecystokinin
4. Gastric inhibitory peptide



58. Which of the following will bring about inhalation in human beings?  
I. Contraction of diaphragm  
II. Contraction of internal intercostals  
III. Contraction of external intercostals
1. Only I and II
  2. Only I and III
  3. Only II and III
  4. I, II and III
59. The activities of the human heart can be regulated through the autonomic nervous system by a special neural center located in:
1. Medulla oblongata
  2. Hypothalamus
  3. Mid brain
  4. Cerebrum
60. Each time the sodium potassium pump functions, it pumps:
1. 3 Na<sup>+</sup> ions to the inside and 2 K<sup>+</sup> ions to the outside
  2. 3 Na<sup>+</sup> ions to the outside and 2 K<sup>+</sup> ions to the inside
  3. 2 Na<sup>+</sup> ions to the inside and 3 K<sup>+</sup> ions to the outside
  4. 2 Na<sup>+</sup> ions to the outside and 3 K<sup>+</sup> ions to the inside
61. All the following are favorable for the formation of oxyhemoglobin at the lungs except:
1. High PO<sub>2</sub>
  2. Low PCO<sub>2</sub>
  3. Low temperature
  4. Low pH
62. Which of the following hormones does not act on its target cells through a second messenger?
1. Adrenocorticotrophic hormone
  2. Aldosterone
  3. Thyrocalcitonin
  4. Atrial natriuretic factor
63. Pulmonary fibrosis is a characteristic feature of all cases of:
1. Occupational lung diseases
  2. Bronchial asthma
  3. Emphysema
  4. Pneumonia
64. The neurotransmitter released by the motor neurons at the neuromuscular junction is:
1. Acetylcholine
  2. Noradrenaline
  3. GABA
  4. Adrenaline
65. The micturition reflex is coordinated at the level of:
1. Trygone in bladder wall
  2. Sacral spinal cord
  3. Pontine micturition center
  4. Cerebral cortex
66. Most carbon dioxide in human blood is transported as:
1. Bicarbonate ions
  2. Carbaminohemoglobin
  3. Carboxyhemoglobin
  4. Dissolved in plasma
67. Identify the correct statement:
1. The left ventricle pumps more blood than the right ventricle in normal physiological conditions
  2. The AV valves close during ventricular systole due to attempted backflow of blood into atria
  3. Passive filling accounts for about 30% of ventricular filling
  4. The second heart sound is associated with closure of mitral and aortic semilunar valves

68.

Excess secretion of which of the following hormones in human body can lead to hypertension and a decrease in potassium concentration in plasma?

1. Cortisol
2. Thyroxin
3. Aldosterone
4. ADH

69.

The olfactory bulb in the human brain:

1. is an extension of the limbic system
2. is a part of the olfactory membrane
3. forms an important part of the mesencephalon
4. is located near the Wernicke's area in the temporal cortex

70.

Identify the incorrect statement:

1. All motor neurons innervating a single muscle fiber constitute a motor unit.
2. Cross bridges occur when myosin heads combine with the binding sites on actin.
3. The neurotransmitter that stimulates skeletal muscle is acetylcholine.
4. The area of the sarcomere that contains only thin and elastic filaments is the I band.

71.

Which of the following hormones is secreted due to humoral [body fluids] stimulus?

1. ACTH
2. Parathyroid hormone
3. Testosterone
4. Gonadotropins

72.

The Bowman's capsule and glomerulus constitute the:

1. Malpighian tubule
2. Renal corpuscle
3. Nephron
4. Collecting system

73.

Blood plasma and interstitial fluid are similar in composition except that plasma has a much higher concentration of:

1. Sodium
2. Glucose
3. Proteins
4. Calcium

74.

Veins return blood to the heart from capillaries. An important exception to this rule would be:

1. Pulmonary vein
2. Pre caval
3. Post caval
4. Hepatic portal vein

75.

Gills are generally unsuitable for an animal living on land mainly because:

1. They are too delicate to be sustained in air currents
2. There will be a loss of large amount of water from the respiratory surface
3. They are less efficient than other respiratory organs
4. Gills cannot be used to remove carbon dioxide from the body

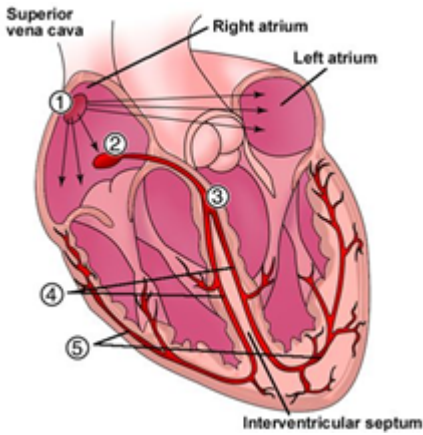
76.

The main disadvantage of urea as an excretory product for animals eliminating it would be:

1. Its high toxicity
2. Needs lot of water to be eliminated
3. It being an osmolyte
4. Energy expenditure to produce it

77.

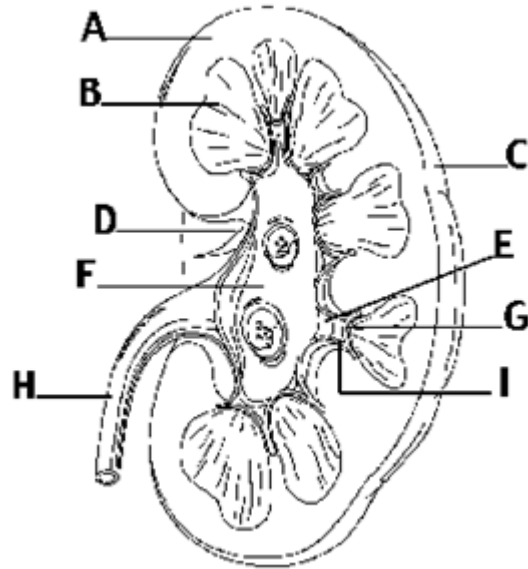
Study the given diagram and identify the correct statement.



1. If 1 is damaged heart will stop
2. 2 ensures that atria contract prior to ventricles
3. 4 has the highest conduction velocity
4. 3 is the bundle of nerve fibers that carry impulse to the ventricles

78.

Study the given diagram and identify the letters that show papilla, minor calyx, major calyx and renal pelvis respectively.



1. E, F, G and H
2. I, F, G, and E
3. I, F, G and H
4. G, I, E and F

79.

The steps of the cardiac cycle in sequence are...

1. isovolumetric contraction, isovolumetric relaxation, ejection, passive ventricular filling, active ventricular filling.
2. isovolumetric relaxation, isovolumetric contraction, ejection, passive ventricular filling, active ventricular filling.
3. isovolumetric contraction, ejection, isovolumetric relaxation, passive ventricular filling, active ventricular filling.
4. isovolumetric contraction, ejection, isovolumetric relaxation, active ventricular filling, passive ventricular filling.

80.

Given these events:

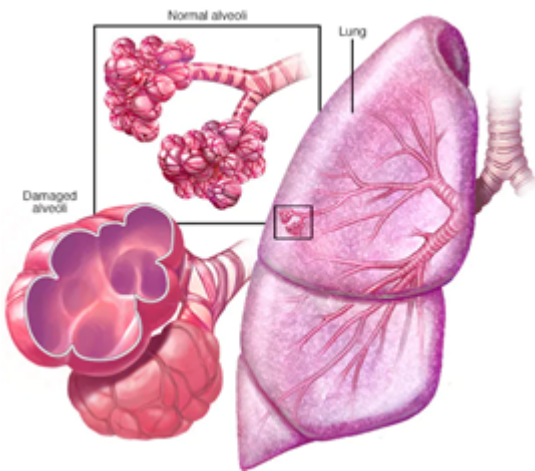
1. active sites on actin myofilament are exposed
2. actin myofilament slides over myosin myofilament
3.  $Ca^{2+}$  ion binds to troponin
4. myosin heads move
5. cross bridges form

Choose the arrangement that lists the correct order in which they occur during a single stimulation of a skeletal muscle.

1. 4,3,2,1,5
2. 3,1,5,4,2
3. 3,2,5,4,1
4. 2,4,3,5,1

81.

The damaged alveoli show in the given diagram is highly suggestive of:



1. Bronchial asthma
2. Emphysema
3. Tuberculosis
4. Lung cancer

82.

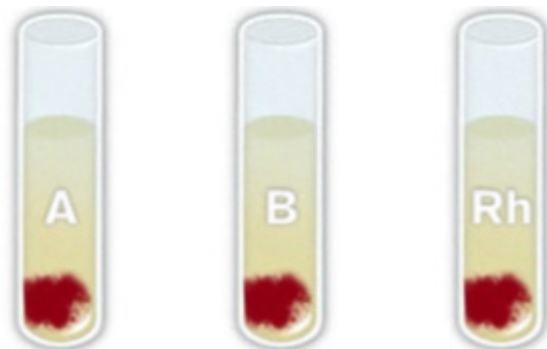
The particular appearance of the person shown in the figure is highly suggestive of which endocrine disorder?



1. Acromegaly
2. Graves' disease
3. Cushing's disease
4. IDDM

83.

During a test to determine blood type of a person, agglutination is seen in all three tubes as shown below:

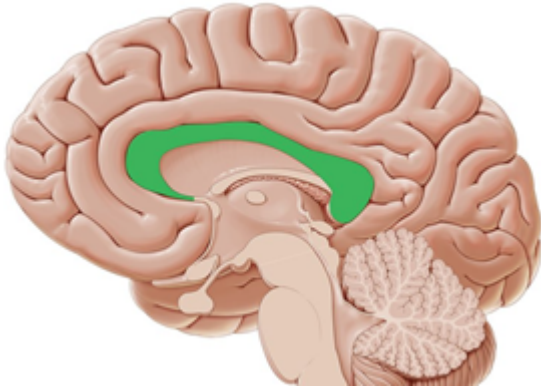


What, most likely, is the blood group of this person?

1. O Rh +ve
2. O Rh -ve
3. AB Rh +ve
4. AB Rh -ve

84.

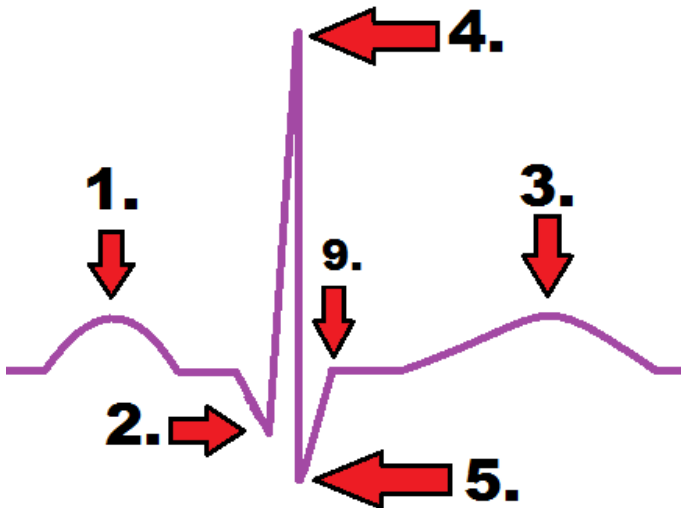
The structure shown in green connects two cerebral hemispheres. What is it called?



1. Corpus luteum
2. Superior colliculus
3. Inferior colliculus
4. Corpus callosum

85.

In the given ECG, ventricular repolarization is shown by:



1. 1
2. 4
3. 9
4. 3

## Zoology - Section B

86.

Identify the incorrectly matched pair:

- |                 |   |
|-----------------|---|
| 1. Enterokinase | Hormone secreted by intestinal mucosa                     |
| 2. Maltase      | A disaccharidase in succus entericus                      |
| 3. Marasmus     | Type of PEM caused by deficiency of proteins and calories |
| 4. Stomach      | Muscularis has an innermost oblique muscle                |

87.

An autoimmune condition affecting which of the following cells present in gastric mucosa lining is likely to affect erythropoiesis?

1. Goblet cells
2. Parietal cell
3. Enterochromaffin like cells
4. Chief cells

88.

The number of which of the following bones is not same in human adult upper and lower limbs?

1. Arm and thigh bones
2. Forearm and leg bones
3. Carpals and tarsals
4. Phalanges

89. Match the structure of human eye in Column I with their function in Column II and select the correct option from the codes given:

	<b>COLUMN I</b>		<b>COLUMN II</b>
A	Cornea	P	Provides opening for light to enter the eyeball
B	Ciliary muscle	Q	Major refractory surface
C	Iris	R	Alters the shape of lens
D	Pupil	S	Controls the amount of light that enters the eyeball

Codes

	A	B	C	D
1.	R	Q	P	S
2.	Q	R	P	S
3.	Q	R	S	P
4.	R	Q	S	P

90. In the human ear sound is transduced in:

1. Tympanic membrane
2. Ear ossicles
3. Vestibular apparatus
4. Cochlea

91. The normal pacemaker of the human heart is located in the:

1. Right atrium
2. Medulla oblongata
3. Interventricular septum
4. Atrioventricular septum

92. Thrombokinase:

1. does not allow blood to clot inside the blood vessels
2. converts inactive prothrombin into active thrombin
3. acts as a thrombolytic
4. is required for formation of thrombocytes

93. Functional residual capacity can be calculated by:

1. Adding tidal volume and expiratory reserve volume
2. Subtracting inspiratory reserve volume from vital capacity
3. Adding expiratory reserve volume and residual volume
4. Subtracting residual volume from total lung capacity

94. All the following animals are uricotelic except:

1. Land snails
2. Reptiles
3. Birds
4. Aquatic insects

95. Excretory products biliverdin and bilirubin are secreted by:

1. Kidneys
2. Large Intestine
3. Liver
4. Bone marrow

96. Flagellar movements are not involved in:

1. Swimming of spermatozoa in humans
2. Maintenance of water current in canal system of sponges
3. Locomotion in Euglena
4. Locomotion in Ctenophores

97. Amygdala in human brain is the part of:

1. Brain stem
2. Limbic system
3. Cerebral cortex
4. Diencephalon

98.

Pars intermedia secretes:

1. MSH
2. Vasopressin
3. GnRH
4. ACTH

99.

The immune response of old persons becomes weak due to the degeneration of:

1. Thymus
2. Thyroid
3. Hypothalamus
4. Pineal

100.

Addison's disease results from:

1. Hypoadrenalism
2. Hypothyroidism
3. Hyperparathyroidism
4. Hyperthyroidism

**[Fill OMR Sheet\\*](#)**

\*If above link doesn't work, please go to test link from where you got the pdf and fill OMR from there