APOLLO

FBISE Biology Class 12
Topical workbook - Volume 1 of 2

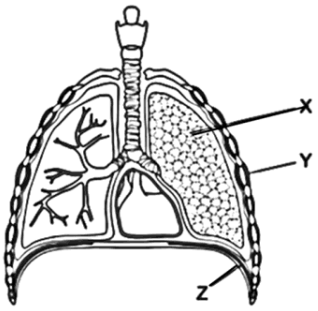
140 questions arranged by official framework topic.
National Curriculum 2022-23; supported examinations from 2027.

APOLLO

Nervous system

Domain G: Nervous System

Q1. Fill the relevant bubble against each question. Each part carries one mark.

<table>
<tr><th>S #</th><th>Question</th><th>(A)</th><th>(B)</th><th>(C)</th><th>(D)</th><th>(A)</th><th>(B)</th><th>(C)</th><th>(D)</th></tr>
<tr><td>(i)</td><td>The diagram below represents the human respiratory system.
 

Which structures contain muscles that contract during inspiration?</td><td>X only</td><td>X and Y only</td><td>Y and Z only</td><td>X, Y and Z</td><td>○</td><td>○</td><td>○</td><td>○</td></tr>
<tr><td>(ii)</td><td>When the outer temperature is higher than body temperature, which of the following adaptations is most likely to occur?
<table>
<tr><th></th><th>Constriction of blood vessels in skin</th><th>Shivering</th><th>Sweating</th></tr>
<tr><td>A</td><td>√</td><td>√</td><td>√</td></tr>
<tr><td>B</td><td>√</td><td>×</td><td>×</td></tr>
<tr><td>C</td><td>×</td><td>√</td><td>×</td></tr>
<tr><td>D</td><td>×</td><td>×</td><td>√</td></tr>
</table></td><td colspan="4"></td><td>○</td><td>○</td><td>○</td><td>○</td></tr>
<tr><td>(iii)</td><td>Which of the following is associated with muscle relaxation?</td><td>Z-line move apart</td><td>I band become shorten</td><td>H-zone disappeared</td><td>Length of sarcomere is reduced</td><td>○</td><td>○</td><td>○</td><td>○</td></tr>
<tr><td>(iv)</td><td>Maintaining a resting membrane potential across the membrane requires energy from ATP. In which of the events ATPs are hydrolyzed?</td><td>Movement of Na^+ ions into the neuron</td><td>Movement of Na^+ ions out of the neuron</td><td>Movement of K^+ ions out of the neuron</td><td>Movement of Cl^- ions into the neuron</td><td>○</td><td>○</td><td>○</td><td>○</td></tr>
</table>

(vi)	Why do most synapses contain microscopic gaps across which an electrical impulse cannot pass directly? How is the transmission of impulse enabled across synapse?	1+2

FBISE model paper | Section B Q2(xiii) OR | 3 marks

		impacts ocean temperature.	
1.5+1.5	OR	Enlist three sensory receptors present in skin and give their specific role.	1+1+1

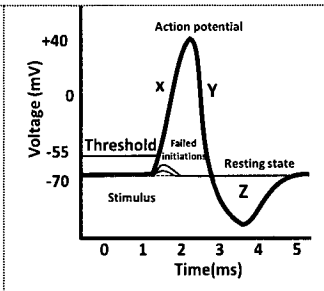
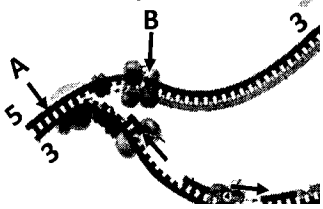
First Annual 2025 | Section B Q2(xii) | 3 marks

(xii)	Explain briefly the difference between sensory and motor neurons.	**03**

(xii)	Explain briefly the difference between sensory and motor neurons.	**03**	**OR**	What is the significance of the endocrine system?
(xiii)	Explain briefly integrated disease management.	**03**	**OR**	Explain briefly the concept of clima significance.
(xiv)	Explain briefly the concept of ozone depletion and its significance.	**03**	**OR**	What is the role of diaphragm in r

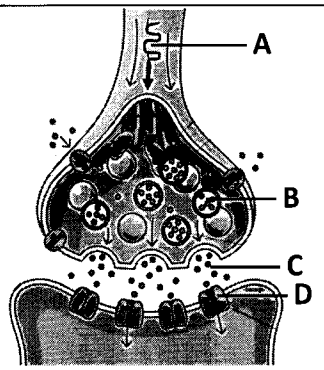
SECTION – C (Marks 26)

Note: Attempt the following questions.

Q.3	Explain the XX-XY mechanism of sex determination in man. Why males are known to be heterogametic?	**4+2**	**OR**	Describe the mechanisms involve carbon dioxide from the tissues blood. Also name the process. happen if no carbonic anhydras blood cells?
Q.4	Describe the steps involved in gene amplification through PCR. Also enlist some of its applications.	**4+3**	**OR**	What are ecological pyramids? pyramids of energy, Biomass and
Q.5	What is meant by action potential? Graph shows action potential in a neuron. Identify and explain the processes labelled as X, Y, Z. 	**1+6**	**OR**	Describe the events of the proces Interpret how DNA conserve one process? Identify the labelled par 

(ix)	What is the role of myelin sheath in nerve conduction?	**03**

First Annual 2025 | Section C Q3 OR | 6 marks

	Identify the labelled parts A-D. Explain synaptic transmission of nerve impulse as well.		
OR			2+4
	Associate multiple alleles with ABO blood group system. What blood type can a person with blood group A receive?		
OR			5+2

Second Annual 2025 | Section A Q8 | 1 mark

8.	Which part of the brain acts as the primary control centre for breathing in humans?	Cerebrum	Thalamus	Cerebellum	Medulla

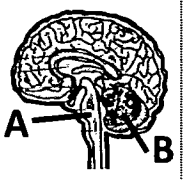
Second Annual 2025 | Section A Q10 | 1 mark

10.	A conditioned reflex differs from a simple reflex as it:	Is learned through experience	Does not involve the nervous system	Is involuntary	Involves spinal cord only

Second Annual 2025 | Section B Q2(iii) | 3 marks

(iii)	Differentiate between resting and active membrane potential. (Any three differences)	03

Second Annual 2025 | Section B Q2(v) | 3 marks

		03
State the principle of peritoneal dialysis. Also write its process.		1+2
a. Label the parts A and B. **b.** Which part of Limbic system regulates autonomic functions? **c.** Which part of Limbic system can be called emotional center? And why?		1x3

Second Annual 2025 | Section B Q2(vi) OR | 3 marks

OR	Elaborate the role of any three excitatory neurotransmitters.	1x3

Second Annual 2025 | Section C Q3 OR | 6 marks

OR	Explain imprinting and latent learning behaviors with examples.	**3+3**

First Annual 2026 | Section B Q2(vi) OR | 3 marks

OR	**a.** Describe the process of release of neurotransmitters at the synaptic knob. **b.** How do neurotransmitters affect the post-synaptic membrane?	**2+1**

First Annual 2026 | Section B Q2(xiii) OR | 3 marks

1.5 + 1.5	OR	Give a brief comparison of MRI and CT scan.	1.5 + 1.5

First Annual 2026 | Section A Q6 | 1 mark

6.	The sodium-potassium pump actively transports:	3 Na^+ out and 2 K^+ in	Equal Na^+, K^+ in and out	3 Na^+ in and 2 K^+ out	2 Na^+ in and 3 K^+ out

First Annual 2026 | Section B Q2(vi) | 3 marks

(vi)	Briefly describe synapse. Draw its labeled diagram.	1+2	OR

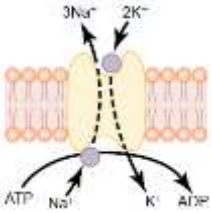
First Annual 2026 | Section B Q2(viii) | 3 marks

(viii)	What is nerve impulse? How it is generated in neurons?	03	OR

First Annual 2026 | Section B Q2(xiii) OR | 3 marks

OR	Associate the effects of drug addiction and tolerance with the functioning of the nervous system.	1.5 + 1.5

FBISE model paper | Section B Q2(viii) | 3 marks

(viii)	The following diagram shows the movement of Na^+ and K^+ ions across the neuron membrane:  a) Name the transporter protein involved in the diagram. b) Pinpoint the direction of movement of ions with reference to the inside and outside of the neuron.	1+2

First Annual 2026 | Section B Q2(iv) | 3 marks

List and briefly explain any two factors that affect the velocity of nerve impulse.	1.5 + 1.5

First Annual 2026 | Section C Q3 OR | 4 marks

OR	If a bug bites you the message generates action potential. Explain factors that help in generating action potential. Draw diagram as well.	4
	How does regulation of pH occur through chloride	

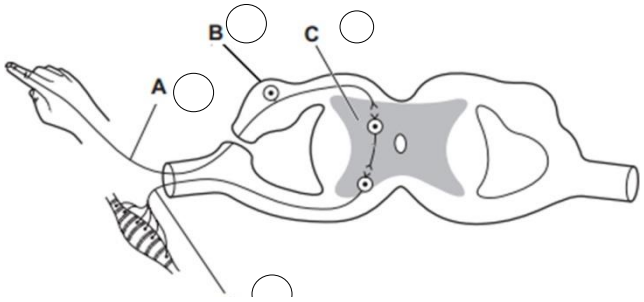
FBISE model paper | Section A Q9 | 1 mark

9. Autonomic functions of body such as heartbeat, blood pressure and respiration are controlled by:

A. Cerebellum ◯ B. Pons ◯
C. Medulla ◯ D. Thalamus ◯

FBISE model paper | Section A Q11 | 1 mark

11. The given diagram shows a simple reflex arc. Which labelled part has neuron cell bodies and non-myelinated parts of nerve fibre?



FBISE model paper | Section B Q2(ii) | 3 marks

Name cranial and facial bones with paired and unpaired classification. (1.5+1.5)

ii. Name any three types of mechanoreceptors in skin with their specific stimuli. (1+1+1)

OR

FBISE model paper | Section B Q2(iv) OR | 3 marks

OR

Define inhibitory and excitatory neurotransmitters with example. (1.5+1.5)

OR

What are the factors involved in the establishment and maintenance of resting membrane potential in a neuron? Show diagrammatically as well. (4+2)

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Endocrine system

Domain G: Nervous System

FBISE model paper | Section A Q1(xvii) | 1 mark

(xvii)	Identify the hormones X in the given diagram produced by pituitary glands. 	TSH	ACTH	STH	MSH

FBISE model paper | Section B Q2(ix) | 3 marks

(ix)	Write the names of two pituitary gonadotrophins. Give one function of each.	1+2

FBISE model paper | Section C Q4 | 6 marks

Q. 4	Write names and functions of hormones produced by **Thyroid gland**. Write about problems related to abnormal secretion of hormones in different stages.	2+2+2

First Annual 2025 | Section B Q2(xii) OR | 3 marks

What is the significance of the hypothalamus in the endocrine system?	03

First Annual 2025 | Section B Q2(viii) OR | 3 marks

	What is the function of ovaries in the female reproductive system?	03

First Annual 2025 | Section B Q2(xiii) | 3 marks

(xiii)	Describe the mechanism of action of insulin on target cells.	03

First Annual 2025 | Section B Q2(xiv) OR | 3 marks

	(Genetic unit)	
OR	What is the role of estrogen and progesterone in female reproductive physiology?	**03**

Second Annual 2025 | Section A Q9 | 1 mark

	control centre for breathing in humans?				
9.	Melanocyte stimulating hormone is produced by:	Thyroid gland	Pituitary gland	Adrenal gland	Pancreas

Second Annual 2025 | Section A Q12 | 1 mark

12.	Which hormone is responsible for the initiation of labour in humans?	Prolactin	Oxytocin	Progesterone	Estrogen

Second Annual 2025 | Section A Q13 | 1 mark

13.	Thyrotropin releasing factor (TRF) is produced by?	Thymus gland	Thalamus	Hypothalamus	Thyroid gland

Second Annual 2025 | Section B Q2(ii) OR | 3 marks

	successfully?	
OR	Narrate the role of hormones produced by adrenal medulla. (Write names and functions)	**1x3**

Second Annual 2025 | Section B Q2(viii) OR | 3 marks

OR	Outline the hormonal regulation of the male reproductive system in humans.	**03**

First Annual 2026 | Section B Q2(ix) | 3 marks

(ix)	Compare Estrogen and Testosterone.	**1.5 + 1.5**

First Annual 2026 | Section C Q4 OR | 6 marks

OR	Describe three active hormones produced by thyroid gland.	**2x3**

First Annual 2026 | Section A Q2 | 1 mark

Which one of the following is **NOT** an endocrine gland?	Pancreas	Parathyroid	Salivary gland	Testis
Which structure prevents food from				

First Annual 2026 | Section B Q2(ix) | 3 marks

(ix)	Name the hormones secreted by anterior pituitary.	03	OR	

First Annual 2026 | Section C Q4 | 6 marks

Q.4	Describe the location and function of pancreas as an endocrine gland.	3+3	OR	Elaborate the steps of recombinant biotechnology taking the example of production of insulin.	06

First Annual 2026 | Section B Q2(v) | 3 marks

Explain briefly mode of action of protein Hormones.	03	OR	Draw and name the types of chromosomes on the basis of position of centromere. (Any three types)	1

FBISE model paper | Section A Q12 | 1 mark

12. Which one is **NOT** related to insulin?

A. It promotes glycogenosis. ◯
B. It inhibits gluconeo genesis. ◯
C. It's under secretion causes glycosuria. ◯
D. It's under secretion causes hypoglycemia. ◯

FBISE model paper | Section B Q2(iii) OR | 3 marks

What are the characteristics(symptoms) of different types of hypothyroidism? (1.5+1.5)

FBISE model paper | Section B Q2(iii) | 3 marks

iii. Name any three types of hormones on the basis of their chemical nature with one example of each. (1+1+1)

FBISE model paper | Section B Q2(viii) | 3 marks

viii. Draw a flow sheet showing the hormonal control of male reproductive system. (3)

FBISE model paper | Section B Q2(viii) OR | 3 marks

OR

Discuss the role of parathyroid gland in regulating calcium level in body. (3)

FBISE model paper | Section B Q2(xii) OR | 3 marks

OR

Outline the concept of feedback mechanism of hormone.

APOLLO

Disease and Immunity

Domain I: Disease and Immunity

FBISE model paper | Section A Q1(ix) | 1 mark

(ix)	A person is injected with gamma globulin (antibodies) against hepatitis B. It is:	Artificially acquired passive immunity	Artificially acquired active immunity	Naturally acquired active immunity	Naturally acquired passive immunity

FBISE model paper | Section B Q1(vi) OR | 3 marks

OR	If the number of macrophages has been decreased in a patient, how it might affect his 2nd line of defense and specific immune response?	1.5+1.5

	with diagrams.	
OR	Describe the role of **B-cells** in **humoral or antibody-mediated immune response** and explain the structure and mode of action of **antibodies**.	3+3

First Annual 2025 | Section C Q4 OR | 7 marks

	Associate multiple alleles with ABO blood group system. What blood type can a person with blood group A receive?	
OR		**5+2**

Second Annual 2025 | Section A Q16 | 1 mark

16. The best way to **prevent** tetanus is:	Keep cleanlines	Use medicines	Use Antibiotics	Have vaccination

Second Annual 2025 | Section B Q2(vii) OR | 3 marks

OR	**Justify why Rh incompatibility could be a danger to the developing fetus and mother.**	**1+2**

First Annual 2026 | Section B Q2(vi) | 3 marks

(vi)	What are macrophages? List any two functions of macrophages in defense.	**1+2**

First Annual 2026 | Section B Q2(x) OR | 3 marks

OR	Briefly explain any three types of T-Cells.	1x3

First Annual 2026 | Section C Q4 | 6 marks

Q.4	a. Draw labeled structural model of antibody molecule. b. Differentiate between active and passive immunity.	3+3
Q.5	Discuss the path of blood through pulmonary and	

First Annual 2026 | Section A Q11 | 1 mark

11. Active immunity is developed by:	Transfer of plasma	Blood transfusion	Exposure to antigens	Injection of antibodies

First Annual 2026 | Section B Q2(vi) OR | 3 marks

OR	How skin prevents the invasion of pathgems in human body? (any three points)	1x3

First Annual 2026 | Section B Q2(x) | 3 marks

(x)	What is complement system? How complement proteins destroy bacteria? (Any two mechanisms briefly)	1x3	OR

OR	a. Describe the role of B-cells in antibody-mediated immunity. b. Draw the structural model of an antibody molecule.	4+3

FBISE model paper | Section B Q2(vi) OR | 3 marks

If the number of macrophages has been decreased in a patient, how it might affect his 2nd line of defense and specific immune response?	1.5+1.5

FBISE model paper | Section A Q6 | 1 mark

6. The best way to prevent tetanus is to take:

A. Antibiotic ◯ B. Painkillers ◯

C. Vaccine ◯ D. Sedatives ◯

APOLLO

Biotechnology

Domain J: Biotechnology

FBISE model paper | Section A Q1(x) | 1 mark

(x)	Which one of the following is **palindromic sequence?**	GATC	GGTT	CGAT	TTCC

FBISE model paper | Section A Q1(xiv) | 1 mark

(xiv)	Which one of the following **recombinant DNA technology** tools is incorrectly paired with its use?	Restriction endonuclease → production of RFLP	DNA ligase → production of sticky ends fragments	Reverse transcriptase → production of cDNA	PCR → Gene amplification

FBISE model paper | Section B Q2(xi) | 3 marks

(xi)	Name any one plasmid vector being used to transfer human insulin gene. Mention any two properties that should essentially be present in a plasmid vector.	1+2

	coordinating different phases of heartbeat.	
OR	Scientists are investigating a crime and found a tiny amount of DNA from a hair. To study it properly, they need to make many copies of that DNA in the lab. Explain how biotechnology helps to copy DNA outside the body (in vitro) using a special method. Also, describe how this method works step by step, and include a labeled diagram to show the process.	4+2

First Annual 2025 | Section B Q2(v) OR | 3 marks

What is the primary role of restriction enzymes in genetic engineering?	03

First Annual 2025 | Section B Q2(vii) OR | 3 marks

What is the purpose of vector and DNA ligase in DNA cloning?	03

First Annual 2025 | Section B Q2(viii) OR | 3 marks

A patient is diagnosed with a genetic disorder caused by a defective gene. How can gene therapy be used to treat this disorder? Explain briefly.	03

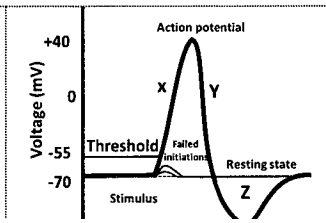
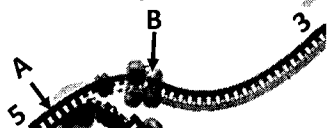
First Annual 2025 | Section C Q4 | 7 marks

Q.4	Describe the steps involved in gene amplification through PCR. Also enlist some of its applications.	**4+3**

Explain briefly integrated disease management.	03	OR	Explain briefly the concept of climax community and its significance.	03
Explain briefly the concept of ozone depletion and its significance.	03	OR	What is the role of diaphragm in respiration?	03

SECTION – C (Marks 26)

Attempt the following questions.

Explain the XX-XY mechanism of sex determination in man. Why males are known to be heterogametic?	4+2	OR	Describe the mechanisms involved in the transport of carbon dioxide from the tissues to lungs in human blood. Also name the process. Explain what would happen if no carbonic anhydrase is present in red blood cells?	4+2
Describe the steps involved in gene amplification through PCR. Also enlist some of its applications.	4+3	OR	What are ecological pyramids? Draw and explain pyramids of energy, Biomass and number.	1+6
What is meant by action potential? Graph shows action potential in a neuron. Identify and explain the processes labelled as X, Y, Z. 	1+6	OR	Describe the events of the process of DNA replication. Interpret how DNA conserve one strands during this process? Identify the labelled parts **A** and **B**. 	5+1+1

First Annual 2025 | Section B Q2(ix) OR | 3 marks

OR	Describe the role of microbes in energy production.	**03**

First Annual 2025 | Section B Q2(v) OR | 3 marks

OR	A forensic scientist needs to analyse DNA sample from a crime scene. What biotechnological technique can be used to analyse the sample? Enumerate main steps.	**03**
	Describe the regulation of breathing by the nervous	

First Annual 2025 | Section B Q2(vi) | 3 marks

(vi)	How does gel electrophoresis separate DNA fragments?	**03**

First Annual 2025 | Section B Q2(vii) | 3 marks

(vii)	Enumerate the main steps for creating a recombinant DNA molecule.	**03**

First Annual 2025 | Section B Q2(viii) | 3 marks

(viii)	A community is affected by a water borne disease. How biological treatment methods can be used to treat the sewage? Explain briefly.	**03**	**OR**
(ix)	What is the role of myelin sheath in nerve conduction?		

First Annual 2025 | Section B Q2(xiv) | 3 marks

(xiv)	What is the purpose of marker gene like antibiotic resistant gene in plasmid?	**03**

First Annual 2025 | Section C Q5 OR | 7 marks

OR	Explain tissue culture. How this technique is different in plants and animals?	**4+3**

Second Annual 2025 | Section B Q2(ix) OR | 3 marks

OR	Write briefly about three models proposed about mechanism of DNA replication.	**1x3**

Second Annual 2025 | Section B Q2(x) OR | 3 marks

OR	Write down the principle of gel electrophoresis. Also write its uses.	2+1

Second Annual 2025 | Section B Q2(xiii) OR | 3 marks

OR	What are the properties of a good vector? Write any three.	03

Second Annual 2025 | Section B Q2(xiv) | 3 marks

(xiv)	What is genomic library? How is it constructed?	**1+2**

Second Annual 2025 | Section C Q4 OR | 7 marks

OR	Explain the principle and method of DNA sequencing used by Sanger-Coulson. Draw diagram.	**5+2**

Second Annual 2025 | Section C Q5 | 6 marks

Q.5	Describe mechanism of polymerase chain reaction. Also draw diagram.	**4+2**

First Annual 2026 | Section B Q2(xi) OR | 3 marks

	a. What is meant by Genetically Modified Organism?	
OR	**b.** Briefly state any two applications of Transgenic bacteria.	**1+2**
	Write names and briefly discuss any two species that	4+5

First Annual 2026 | Section C Q6 | 6 marks

Q.6	Describe the steps involved in Polymerase Chain Reaction PCR. Make flow sheet as well.	**5+1**

First Annual 2026 | Section A Q12 | 1 mark

2. Polymerase chain reaction is a _____ technique.	DNA degradation	DNA hybridization	DNA sequencing	DNA amplification
An increase in ocean temperature mainly	Coral	Reduced	Increased	Decreased

First Annual 2026 | Section A Q16 | 1 mark

Plasmids are used as vectors because they:	Only exist in viruses	Cannot carry foreign genes	The destroy DNA of virus	Have an origin of replication

First Annual 2026 | Section B Q2(xi) | 3 marks

(xi)	What is plasmid? How plasmid acts as vectors in genetic engineering?	1+2	OR
(xii)	State any three roles of liver		

First Annual 2026 | Section C Q4 OR | 6 marks

OR	Elaborate the steps of recombinant biotechnology taking the example of production of insulin.	06
	Describe the role of B cells in antibody mediated	

First Annual 2026 | Section B Q2(x) OR | 3 marks

	Justify.				
(x)	Explain roles of any three foetal hormones in birth.	1x3	OR	Write down characteristics of vectors used in biotechnology. (Any three)	1:

First Annual 2026 | Section B Q2(xiii) | 3 marks

Taq polymerase and thermocycler are necessary for PCR. Why?	03	OR	A 30 year old athlete is competing in a marathon in extreme heat. What thermoregulatory strategies can he use to prevent heat stroke?	(

FBISE model paper | Section A Q14 | 1 mark

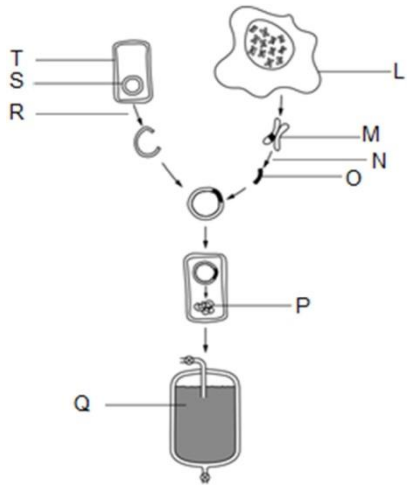
14. Which one of the following recombinant DNA technology tool is incorrectly paired with its use?
    A. Restriction endonuclease--------- production of RFLP ◯
    B. DNA ligase---------- production of sticky endsinrestriction fragments
    C. Reverse transcriptase ---------- production of cDNA ◯
    D. PCR ---------- gene amplification ◯

OR

Outline the different steps of PCR. (3)

OR

Given figure is a flow diagram showing how insulin is produced using genetic engineering.



i. Define and describe the steps involved in recombinant DNA technology. (3)

ii. At which step/s restriction endonuclease enzyme was used in this process? Why is this enzyme named so? (1.5)

iii. Complete Table as completed in first row. (2.5)

Letter from figure	**Name**	**Description**
M	**chromosomes**	**Threads of DNA found in the nucleus**
		Section of DNA removed from human cell
	Plasmid	
		Type of cell that is genetically engineered
		specific chain of amino acids coded by the section of DNA removed from the human cell
	Fermenter	

APOLLO

Biostatistics and data analyzing

Domain K: Biostatistics and Data Handling

FBISE model paper | Section A Q1(xv) | 1 mark

(xv)	Which of the following best defines the **mean** of a data set in biostatistics?	The middle value when data is arranged in ascending order	The most frequently occurring value in a data set	The sum of all values divided by the total number of values	The difference between the highest and lowest values

FBISE model paper | Section B Q1(iv) | 3 marks

(iv)	Define the terms range and percentile in biostatistics with one example of each.	1.5+1.5	OR

First Annual 2026 | Section B Q2(iv) | 3 marks

(iv)	Calculate Median and Mean of given data: 20, 14, 6, 8, 9, 12, 16, 4.

(iv)	Calculate Median and Mean of given data: 3, 21, 6, 18, 9, 15, 12.	1+2	OR	Compare arteries and veins. (any three points)	03

The antibiotic sensitivity test, also known as the Kirby-Bauer test, is a widely used laboratory method for determining the effectiveness of antibiotics against specific bacterial strains. Table 2.1 below presents the diameters of the zones of inhibition for antibiotics A, B, C, D, and E, measured across five replicates (R_1, R_2, R_3, R_4, and R_5). One column displays the diameters of the zones of inhibition from control experiments, where only a filter paper disc of the same size, without any antibiotic, was applied. The diameter of antibiotic disc was 2.5 mm.

Table 2.1: Diameters of Zones of inhibition in millimeters

Replicates	Antibiotics under investigation					
	A	**B**	**C**	**D**	**E**	**Control**
R_1	6.0	10.0	2.5	12.5	4.5	2.5
R_2	7.0	10.1	2.5	11.0	5.0	2.5
R_3	6.5	12.0	2.5	12.5	5.0	2.5
R_4	7.0	10.2	2.5	12.0	4.0	2.5
R_5	6.0	2.5	2.5	12.5	5.0	2.5
Average/ Mean	6.5	10.5	2.5	12.1	4.7	2.5

a) Analyze the data given in table 2.1 and pinpoint the anomalous reading: [1]

b) Interpret the data given in table 2.1 and conclude the most effective and least effective antibiotics with reason for your interpretation. [2]

c) What is the purpose of control experiment in this test? [1]

d) Draw a bar chart of the data presented in table 2.1 and label it. [2]

Following is the data of height of 10 students studying in class 12 (same age group):

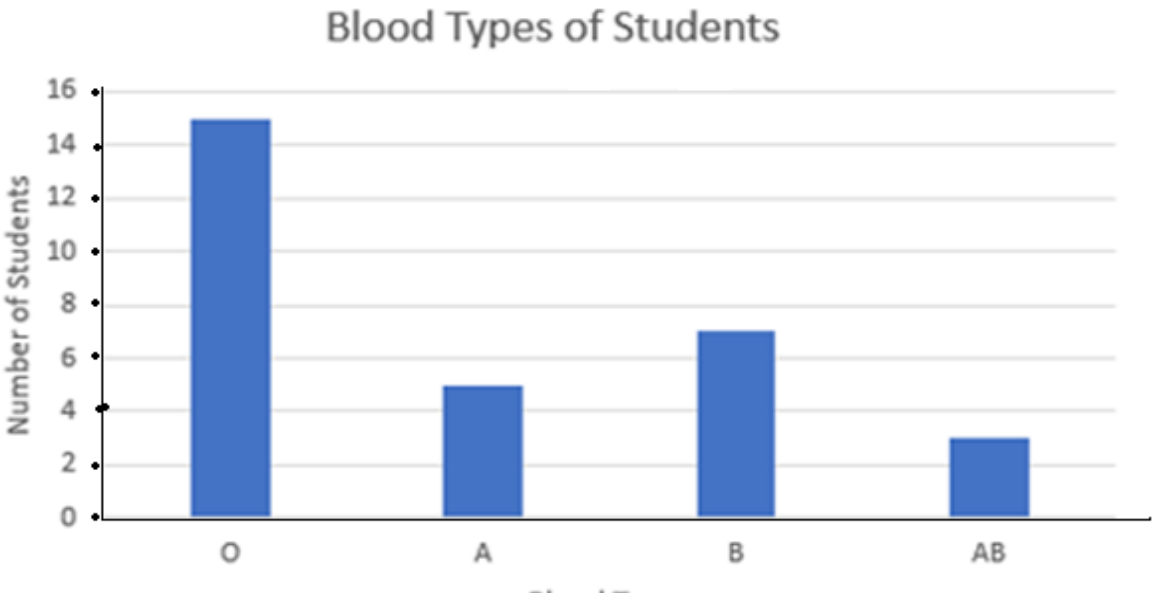
Student Names	Height (cm)
A	180
B	182
C	175
D	171
E	160
F	172
G	170
H	158
I	165
J	168

a) Calculate the mean value of the data given in table 3.1. Also show your working. [1]

b) Calculate the standard deviation of the data given in table 3.1. Show your working.[3]

c) Calculate standard errors, draw a bar chart and show the error bars. [1+1]

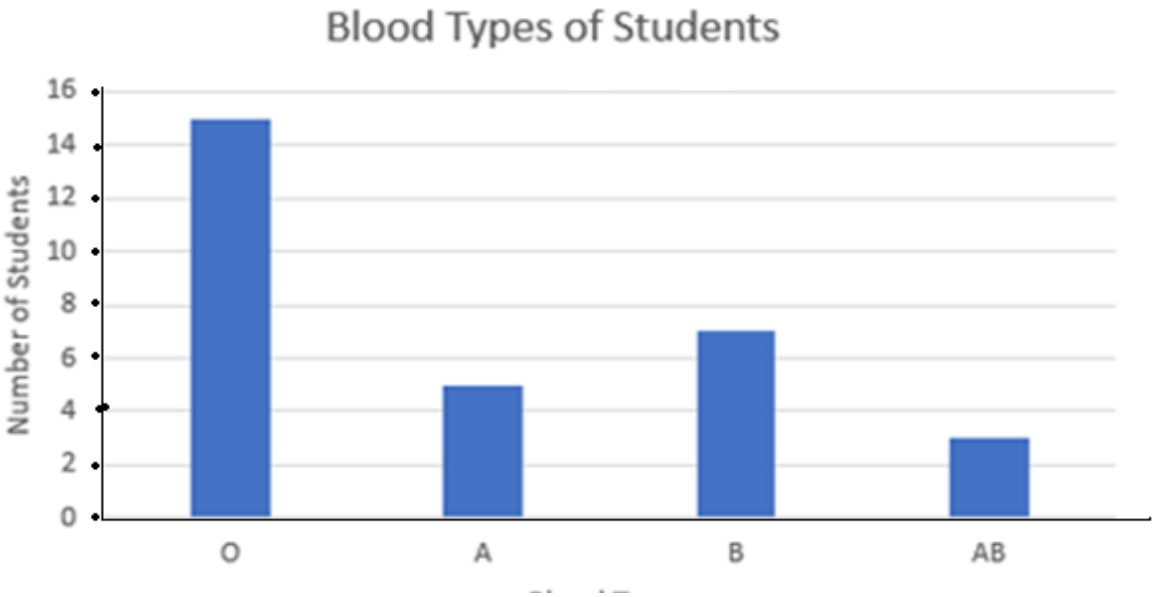
Q1. A group of students performed ABO blood group testing in biology lab. After getting results, the data was plotted into following graph.



i. Name the type of graph shown. Which variable is on x-axis and which one is on y-axis? (1)

_____

Q1. A group of students performed ABO blood group testing in biology lab. After getting results, the data was plotted into following graph.



ii. Name and sketch another type of graph which can be plotted by using this data. (1)

_____

APOLLO

Structural biology and computational biology

Domain L: Structural Biology and Computational Biology

FBISE model paper | Section A Q1(xvi) | 1 mark

(xvi)	Which of the following is NOT mentioned as an example of biological molecules exhibiting structural homology?	Lipid	RNA	Protein	DNA

FBISE model paper | Section B Q2(xiii) | 3 marks

(xiii)	What is the scientific term used for the presence of similar 3D structures between two or more biological molecules? What do you conclude through these similarities?	1.5+1.5	OR

First Annual 2025 | Section B Q2(x) | 3 marks

(x)	How do histone proteins contribute to the formation of nucleosomes?	**03**

Second Annual 2025 | Section B Q2(xi) | 3 marks

(xi)	Differentiate between convergent and divergent evolution on the basis of inheritance of homologous and analogous organ.	**03**

First Annual 2026 | Section B Q2(xiii) | 3 marks

(xiii)	Briefly explain the following and give one example of each: **a.** Sequence Homology **b.** Structural Homology	**1.5** **+** **1.5**
(xiv)	Briefly explain the role of 'receptors' and 'control	**1.5**

First Annual 2026 | Section A Q1 | 1 mark

Structural homology refers to:	Completely different organs	Unrelated species features	Similar structure due to common ancestry	Similar function but different structure

First Annual 2026 | Section B Q2(xiii) | 3 marks

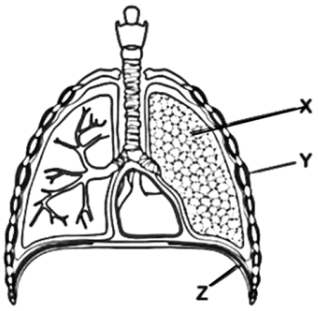
(xiii)	Differentiate between homologous and analogous structures.	1.5 + 1.5	OR
(xiv)	Briefly describe two mechanisms used by the human	1.5	

APOLLO

Respiratory system

Domain R: Human Physiology

Q1. Fill the relevant bubble against each question. Each part carries one mark.

S #	Question	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)
(i)	The diagram below represents the human respiratory system.  Which structures contain muscles that contract during inspiration?	X only	X and Y only	Y and Z only	X, Y and Z	○	○	○	○

	Question	Marks
OR	List three effects of smoking on the respiratory system.	1+1+1

OR	What is meant by respiratory surface, give two characteristics features of a good respiratory surface with reference to the human?	1+2

FBISE model paper | Section C Q6 | 6 marks

	the stomach.	
Q. 6	Sketch and describe the mechanism responsible for transporting major percentage of carbon dioxide through blood from tissue bed to lungs.	4+2

First Annual 2025 | Section B Q2(ix) | 3 marks

(ix)	What is the primary function of respiratory system in humans? How is it helpful for the body?	**03**

First Annual 2025 | Section B Q2(xiv) OR | 3 marks

What is the role of diaphragm in respiration?

First Annual 2025 | Section C Q3 OR | 6 marks

OR	Describe the mechanisms involved in the transport of carbon dioxide from the tissues to lungs in human blood. Also name the process. Explain what would happen if no carbonic anhydrase is present in red blood cells?	**4+2**

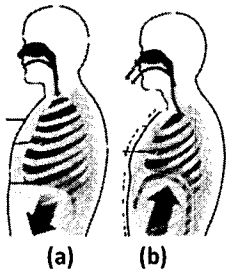
First Annual 2025 | Section B Q2(vi) OR | 3 marks

	steps.	
OR	Describe the regulation of breathing by the nervous system.	03

First Annual 2025 | Section B Q2(vii) OR | 3 marks

OR	What is the role of haemoglobin in transporting oxygen in the blood?	03

First Annual 2025 | Section C Q3 | 6 marks

The figure shows respiratory system in man. Name and explain the processes happening in figures 'a' and 'b'. Lungs are spongy in nature. They never pull air or push it out. Then how does breathing takes place?	 (a) (b)	1+4+1
Identify the labelled parts from A – D. How cross		

Second Annual 2025 | Section A Q3 | 1 mark

Which one of the following event occurs during inspiration?	Less pressure in lungs	Decrease in thoracic cavity volume	Rib cage lowers	Diaphragm relaxes
The **nitrogenous** waste excreted by				Carbon

Second Annual 2025 | Section B Q2(i) | 3 marks

(i)	Which characteristics of respiratory surfaces make them efficient for exchange of gases? Write briefly.	1x3

Second Annual 2025 | Section C Q3 | 6 marks

Q.3	Describe the process of gaseous transport of carbon dioxide in humans.	3+2 +1

First Annual 2026 | Section B Q2(i) OR | 3 marks

OR	Enlist any three properties of an efficient respiratory surface.	1x3
	Outline the role of respiratory pigments. (Three points)	

First Annual 2026 | Section B Q2(ii) OR | 3 marks

	surface.	
OR	Outline the role of respiratory pigments. (Three points)	03

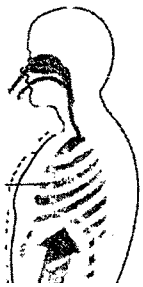
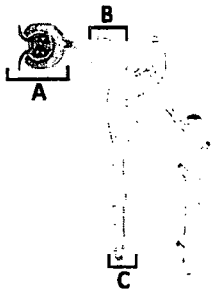
First Annual 2026 | Section A Q3 | 1 mark

endocrine gland?				
Which structure prevents food from entering the trachea?	Pharynx	Bronchi	Larynx	Epiglottis
Which process helps to conserve heat in	Vasoconstric			

First Annual 2026 | Section B Q2(i) OR | 3 marks

OR	How is emphysema caused? What impact does it have on the body?	1.5 + 1.5

First Annual 2026 | Section B Q2(ii) | 3 marks

Identify the ventilation phase. Briefly explain this phase.		03	OR	Identify the parts A, B, and C in the diagram and write one function of each.		03

First Annual 2026 | Section C Q6 | 6 marks

Q.6	Describe the ways of CO_2 transportation in blood: **a.** In form of HCO_3^- **b.** As carboxyhaemoglobin **c.** Being dissolved in blood plasma.	3+2 +1	OR	H m ha

First Annual 2026 | Section B Q2(i) | 3 marks

Enlist three adaptations of alveoli which enable them to act as site of gaseous exchange.	1x3

First Annual 2026 | Section B Q2(vi) OR | 3 marks

OR	Write down three comparisons of exhalation and inhalation.	

First Annual 2026 | Section C Q4 OR | 4 marks

OR	How does regulation of pH occur through chloride bicarbonate exchange during transport of carbon dioxide? Also draw diagram.	4
	Explain mechanism of DNA replication. (No diagram	

FBISE model paper | Section A Q1 | 1 mark

1. They are in lungs where blood vessels and airways pass in and out is called:

A. Pelvis ◯ B. Hilum ◯

C. Mediastinum ◯ D. Fissure ◯

FBISE model paper | Section B Q2(vii) OR | 3 marks

Describe Hamburger phenomenon. (3)

FBISE model paper | Section B Q2(xiii) | 3 marks

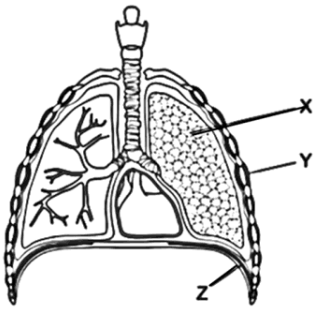
Describe the structural features and functions of the components of human respiratory system.

APOLLO

Urinary system

Domain R: Human Physiology

Q1. Fill the relevant bubble against each question. Each part carries one mark.

<table>
<tr><th>S #</th><th>Question</th><th>(A)</th><th>(B)</th><th>(C)</th><th>(D)</th><th>(A)</th><th>(B)</th><th>(C)</th><th>(D)</th></tr>
<tr><td>(i)</td><td>The diagram below represents the human respiratory system.
 

Which structures contain muscles that contract during inspiration?</td><td>X only</td><td>X and Y only</td><td>Y and Z only</td><td>X, Y and Z</td><td>◯</td><td>◯</td><td>◯</td><td>◯</td></tr>
<tr><td>(ii)</td><td>When the outer temperature is higher than body temperature, which of the following adaptations is most likely to occur?
<table>
<tr><th></th><th>Constriction of blood vessels in skin</th><th>Shivering</th><th>Sweating</th></tr>
<tr><td>A</td><td>√</td><td>√</td><td>√</td></tr>
<tr><td>B</td><td>√</td><td>×</td><td>×</td></tr>
<tr><td>C</td><td>×</td><td>√</td><td>×</td></tr>
<tr><td>D</td><td>×</td><td>×</td><td>√</td></tr>
</table></td><td colspan="5"></td><td>◯</td><td>◯</td><td>◯</td><td>◯</td></tr>
<tr><td>(iii)</td><td>Which of the following is associated with muscle relaxation?</td><td>Z-line move apart</td><td>I band become shorten</td><td>H-zone disappeared</td><td>Length of sarcomere is reduced</td><td>◯</td><td>◯</td><td>◯</td><td>◯</td></tr>
<tr><td>(iv)</td><td>Maintaining a resting membrane potential across the membrane requires energy from ATP. In which of the events ATPs are hydrolyzed?</td><td>Movement of Na^+ ions into the neuron</td><td>Movement of Na^+ ions out of the neuron</td><td>Movement of K^+ ions out of the neuron</td><td>Movement of Cl^- ions into the neuron</td><td>◯</td><td>◯</td><td>◯</td><td>◯</td></tr>
<tr><td>(v)</td><td>In small intestines, the dipeptides are converted to amino acids by the enzyme:</td><td>Aminopeptidase</td><td>Erypsin</td><td>Trypsin</td><td>Enterokinase</td><td>◯</td><td>◯</td><td>◯</td><td>◯</td></tr>
<tr><td>(vi)</td><td>Antiretroviral drugs differ from general antivirals as they:</td><td>only treat bacterial infections</td><td>specifically target retroviruses like HIV</td><td>cure all viral infections permanently</td><td>work only against influenza viruses</td><td>◯</td><td>◯</td><td>◯</td><td>◯</td></tr>
<tr><td>(vii)</td><td>Which of the following events occur during ventricular systole?</td><td>Contraction of atria</td><td>Relaxation of ventricles</td><td>Opening of AV valves</td><td>Closing of AV valves</td><td>◯</td><td>◯</td><td>◯</td><td>◯</td></tr>
<tr><td>(viii)</td><td>If you took a drug that inhibited the reabsorption of Na^+ in the loop of Henle, you would:</td><td>have an increased urine output</td><td>have a decreased urine output</td><td>have glucose in urine</td><td>have access of Na+ in blood</td><td>◯</td><td>◯</td><td>◯</td><td>◯</td></tr>
</table>