

APOLLO

# Skeletal system

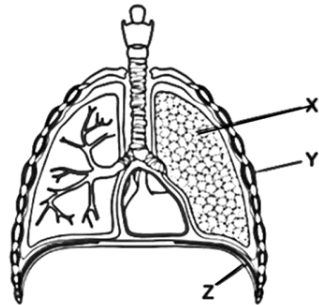
## FBISE Biology Class 12 (HSSC-II)

Domain R: Human Physiology

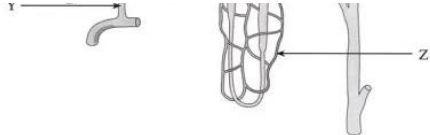
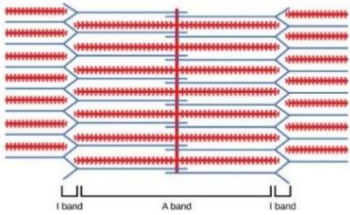
29 questions | questions

Original FBISE question crops. National Curriculum 2022-23 topic.

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

| S #   | Question                                                                                                                                                                                                                                                                                                                                                                                                                                              | (A)               | (B)                                   | (C)                | (D)                            | (A)                   | (B)                   | (C)                   | (D)                   |   |   |   |   |   |   |   |   |   |   |   |   |  |  |  |  |                       |                       |                       |                       |
|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|---------------------------------------|--------------------|--------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|---|---|---|---|---|---|---|---|---|---|---|---|--|--|--|--|-----------------------|-----------------------|-----------------------|-----------------------|
| (i)   | <p>The diagram below represents the human respiratory system.</p>  <p>Which structures contain muscles that contract during inspiration?</p>                                                                                                                                                                                                                         | X only            | X and Y only                          | Y and Z only       | X, Y and Z                     | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |   |   |   |   |   |   |   |   |   |   |   |   |  |  |  |  |                       |                       |                       |                       |
| (ii)  | <p>When the outer temperature is higher than body temperature, which of the following adaptations is most likely to occur?</p> <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> |                   | Constriction of blood vessels in skin | Shivering          | Sweating                       | A                     | √                     | √                     | √                     | B | √ | × | × | C | × | √ | × | D | × | × | √ |  |  |  |  | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
|       | Constriction of blood vessels in skin                                                                                                                                                                                                                                                                                                                                                                                                                 | Shivering         | Sweating                              |                    |                                |                       |                       |                       |                       |   |   |   |   |   |   |   |   |   |   |   |   |  |  |  |  |                       |                       |                       |                       |
| A     | √                                                                                                                                                                                                                                                                                                                                                                                                                                                     | √                 | √                                     |                    |                                |                       |                       |                       |                       |   |   |   |   |   |   |   |   |   |   |   |   |  |  |  |  |                       |                       |                       |                       |
| B     | √                                                                                                                                                                                                                                                                                                                                                                                                                                                     | ×                 | ×                                     |                    |                                |                       |                       |                       |                       |   |   |   |   |   |   |   |   |   |   |   |   |  |  |  |  |                       |                       |                       |                       |
| C     | ×                                                                                                                                                                                                                                                                                                                                                                                                                                                     | √                 | ×                                     |                    |                                |                       |                       |                       |                       |   |   |   |   |   |   |   |   |   |   |   |   |  |  |  |  |                       |                       |                       |                       |
| D     | ×                                                                                                                                                                                                                                                                                                                                                                                                                                                     | ×                 | √                                     |                    |                                |                       |                       |                       |                       |   |   |   |   |   |   |   |   |   |   |   |   |  |  |  |  |                       |                       |                       |                       |
| (iii) | Which of the following is associated with muscle relaxation?                                                                                                                                                                                                                                                                                                                                                                                          | Z-line move apart | I band become shorten                 | H-zone disappeared | Length of sarcomere is reduced | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |   |   |   |   |   |   |   |   |   |   |   |   |  |  |  |  |                       |                       |                       |                       |

|        |                                                                                                                                                                        |        |          |            |           |
|--------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|----------|------------|-----------|
| (xiii) | <p>The feature which describes <b>tropomyosin</b> is/are:</p> <p>I. globular protein</p> <p>II. thin thread-like structure</p> <p>III. wound around actin filament</p> | I only | III only | II and III | I and III |
|--------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|----------|------------|-----------|

|       |                                                                                                                                                                                                                               |     |
|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
|       |                                                                                                                                            |     |
| (iii) | <p>Identify the phenomenon shown in the following diagram:</p>  <p>What changes occur in I-band, A-band, H-zone, and sarcomere length?</p> | 1+2 |

|       |                                                                                                                      |     |
|-------|----------------------------------------------------------------------------------------------------------------------|-----|
| (vii) | a) What are the main components of an intervertebral disc?                                                           | 1+2 |
| (vii) | a) What are the main components of an intervertebral disc?<br>b) Give two causes of disc slip or herniation of disc. | 1+2 |

|    |                                                                  |         |
|----|------------------------------------------------------------------|---------|
| OR | Describe the steps of <b>bone fracture repair</b> with diagrams. | 4.5+1.5 |
|----|------------------------------------------------------------------|---------|

**arks 26)**

|                                                                                                                                                                                                                        |       |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| 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   |
| What are ecological pyramids? Draw and explain pyramids of energy, Biomass and number.                                                                                                                                 | 1+6   |
| Describe the events of the process of DNA replication. Interpret how DNA conserve one strands during this process? Identify the labelled parts <b>A</b> and <b>B</b> .                                                 | 5+1+1 |
| The given figure shows three types of muscles for movement in animals. Identify and compare the properties of these muscles.                                                                                           | 2+2+2 |

|                                                                                                                                 |     |
|---------------------------------------------------------------------------------------------------------------------------------|-----|
| Identify the labelled parts from A – D. How cross bridges are formed during muscle contraction? Explain.                        | 2+5 |
| Explain the mechanism of transcription. Why the length of transcribed mRNA shortens as it enters the cytoplasm for translation? | 5+2 |

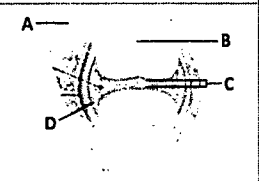
|                                |              |            |             |             |
|--------------------------------|--------------|------------|-------------|-------------|
| The bone dissolving cells are: | Chondrocytes | Osteocytes | Osteoblasts | Osteoclasts |
|--------------------------------|--------------|------------|-------------|-------------|

|    |                                                          |             |           |          |        |
|----|----------------------------------------------------------|-------------|-----------|----------|--------|
| 7. | The immobility and fusion of vertebral joints is called: | Spondylosis | Arthritis | Sciatica | Sprain |
|----|----------------------------------------------------------|-------------|-----------|----------|--------|

|    |                                                                             |    |
|----|-----------------------------------------------------------------------------|----|
|    | Differentiate between skeletal and cardiac muscles. (Any three differences) |    |
| OR |                                                                             | 03 |

|      |                                                                  |     |    |                                                    |
|------|------------------------------------------------------------------|-----|----|----------------------------------------------------|
| (vi) | Briefly describe three types of joints with one example of each. | 1x3 | OR | Elaborate the role of any three neurotransmitters. |
|------|------------------------------------------------------------------|-----|----|----------------------------------------------------|

|    |                                                     |    |
|----|-----------------------------------------------------|----|
| OR | What changes occur in sarcomere during contraction? | 03 |
|----|-----------------------------------------------------|----|

|     |                                                                          |                                                                                    |     |
|-----|--------------------------------------------------------------------------|------------------------------------------------------------------------------------|-----|
| (v) | Identify the joint shown in diagram. Also label its parts A, B, C and D. |  | 1+2 |
|-----|--------------------------------------------------------------------------|------------------------------------------------------------------------------------|-----|

|       |                                     |    |
|-------|-------------------------------------|----|
| (vii) | Compare arthritis and osteoporosis. | 03 |
|-------|-------------------------------------|----|

|    |                                                                                                       |     |
|----|-------------------------------------------------------------------------------------------------------|-----|
| OR | How sliding and filament model explain muscle contraction? Support your answer with suitable diagram. | 5+2 |
|----|-------------------------------------------------------------------------------------------------------|-----|

|                                                                  |                           |                                          |                                |                          |
|------------------------------------------------------------------|---------------------------|------------------------------------------|--------------------------------|--------------------------|
| Under conditions of                                              | Relaxation                | Contraction                              | Relaxation                     | Contraction              |
| In the sliding filament model, muscle contraction occurs due to: | Breaking of filaments     | Sliding of actin over myosin             | Shortening of myosin filaments | Fusion of filaments      |
| The sodium potassium pump actively                               | 2 Na <sup>+</sup> out and | Equal Na <sup>+</sup> and K <sup>+</sup> | 2 Na <sup>+</sup> in and       | 2 Na <sup>+</sup> in and |

|     |                                  |                                                                                     |        |        |        |           |                                                                                         |
|-----|----------------------------------|-------------------------------------------------------------------------------------|--------|--------|--------|-----------|-----------------------------------------------------------------------------------------|
| 15. | In given diagram part iii shows: |  | A band | H zone | I Band | Sarcomere | <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> |
|     |                                  |                                                                                     |        |        |        | Have an   |                                                                                         |

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

|       |                                                             |     |
|-------|-------------------------------------------------------------|-----|
| (iii) | a. Describe the role of calcium ions in muscle contraction. | 1.5 |
|       | b. What happens to sarcomere during contraction?            | 1.5 |

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

|    |                                                             |
|----|-------------------------------------------------------------|
| OR | What is sprain? Enlist its symptoms. How it can be managed? |
|----|-------------------------------------------------------------|

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

|       |                                                                 |     |    |                                                                                        |    |
|-------|-----------------------------------------------------------------|-----|----|----------------------------------------------------------------------------------------|----|
| (vii) | Briefly describe osteoporosis. Mention its causes and symptoms. | 1x3 | OR | State the role of baroreceptors and volume receptors in regulating the blood pressure. | 03 |
|-------|-----------------------------------------------------------------|-----|----|----------------------------------------------------------------------------------------|----|

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

|                                                                       |       |
|-----------------------------------------------------------------------|-------|
| a)How are $Ca^{++}$ released into the muscle cell?                    | 1+1+1 |
| a)How are $Ca^{++}$ released into the muscle cell?                    | 1+1+1 |
| b)From where is $Ca^{++}$ released at the time of muscle contraction? |       |
| a)How are $Ca^{++}$ released into the muscle cell?                    | 1+1+1 |
| b)From where is $Ca^{++}$ released at the time of muscle contraction? |       |
| c)How do $Ca^{++}$ play the role in skeletal muscle contraction?      |       |

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

|       |                                                                                                                      |     |
|-------|----------------------------------------------------------------------------------------------------------------------|-----|
| (vii) | a) What are the main components of an intervertebral disc?<br>b) Give two causes of disc slip or herniation of disc. | 1+2 |
|-------|----------------------------------------------------------------------------------------------------------------------|-----|

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

|  |                                                      |     |
|--|------------------------------------------------------|-----|
|  | Name three types of arthritis and one cause of each. | 1x3 |
|--|------------------------------------------------------|-----|

First Annual 2026 | Section C Q6 | 7 marks

|     |                                                                                               |     |
|-----|-----------------------------------------------------------------------------------------------|-----|
|     | <del>crosses of drosophila.</del>                                                             |     |
| Q.6 | Explain sliding filament model of muscle contraction. Draw a labelled diagram of muscle cell. | 5+2 |

13. I. Globular proteins  
 II. Thin thread-like structures  
 III. Wound around actin filaments  
 The feature(s) which describes tropomyosin is/are:

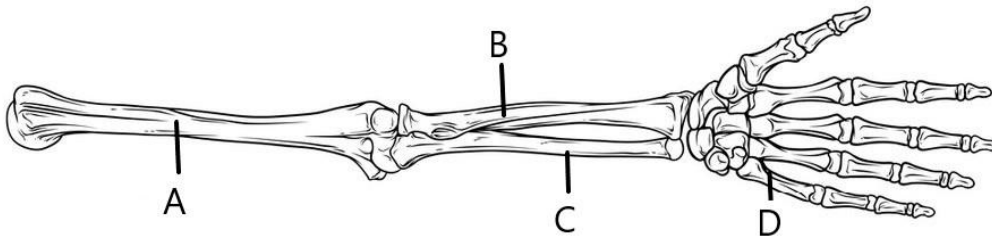
- A. I only ☐ B. III only ☐  
 C. II and III ☐ D. I and III ☐

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

Briefly explain the structure of intervertebral disc. (3)

**Q.3** Describe and sketch sliding filament model of a skeletal muscle fibre. (4+2)

Q2. (i) Identify labelled bones from following diagram. (2)



A: \_\_\_\_\_ B: \_\_\_\_\_  
 C: \_\_\_\_\_ D: \_\_\_\_\_