CLASS IX – SCIENCE PRACTICE PAPER (2026-27)

Step-by-Step Solutions and Marking Scheme

Chapter 3: Tissues in Action | Max. Marks: 40

SECTION A – Objective Questions (1 mark each)

Q1 **[1 mark]**

Meristematic cells are small, have thin walls, a large prominent nucleus and dense cytoplasm with many organelles. Vacuoles are generally absent and the cells are tightly packed. These features allow continuous, rapid division.

Answer: (A)

Q2 **[1 mark]**

In Fig. 1, Jar A roots keep growing, while Jar B roots stop growing after the tips are cut on day 4.

So roots grow only from their tips, which contain actively dividing cells (apical meristem).

Answer: (B)

Q3 **[1 mark]**

Intercalary meristem is present at the base of the internodes (just above the node). It helps grass and similar plants regrow after cutting or grazing.

Answer: (C)

Q4 **[1 mark]**

Sieve tubes are part of phloem, which carries food from the leaves to other parts of the plant. Water moves in xylem, so only food transport is affected.

Answer: (B)

Q5 **[1 mark]**

Collenchyma has living cells with unevenly thickened corners (pectin). It gives support and flexibility, so stems and tendrils bend without breaking.

Answer: (B)

Q6 **[1 mark]**

In Fig. 2: P is the epidermis, Q is the xylem (inner, brown), R is the phloem (outer, red) and S is the central region.

Food is transported by **phloem (R)**.

Answer: (C)

Q7 **[1 mark]**

A single layer of thin, flat cells allows rapid diffusion of liquids and gases (exchange). It lines the blood vessels and lungs.

Answer: (B)

Q8 **[1 mark]**

Tendons connect muscles to bones and transmit the force of contraction to the bone. Ligaments connect bone to bone.

Answer: (A)

Q9 **[1 mark]**

Assertion: true. Xylem is a complex permanent tissue.

Reason: true. It is made of tracheids, vessels, xylem parenchyma and xylem fibres, i.e. more than one cell type. R explains A.

Answer: (A)

Q10 **[1 mark]**

Assertion: true. The shoulder is a ball and socket joint and allows forward, backward, sideways and circular movements.

Reason: false. The shoulder is not a hinge joint; the elbow and knee are hinge joints.

Answer: (C)

SECTION B – Very Short Answer Questions (2 marks each)

Q11 **[2 marks]**

Any two points (1 mark each):

• Ability to divide: meristematic cells divide actively; permanent tissue cells have lost the ability to divide.

• Cell features: meristematic cells have thin walls, dense cytoplasm, a large nucleus and no vacuoles; permanent tissue cells are specialised and may have vacuoles.

• Function: meristematic tissue is responsible for growth; permanent tissue performs support, transport, storage or protection.

Q12 **[2 marks]**

(a) (1 mark) Counting the rings in Fig. 3 gives **8 rings**, so the tree is about **8 years** old.

(b) (1 mark) A narrow ring shows unfavourable growth conditions in that year. Rings are formed by the **lateral meristem**, which increases the girth of the stem.

Q13 **[2 marks]**

Any two (1 mark each: name and function):

• **Cuticle:** waxy layer of cutin that reduces water loss and protects against injury and parasites.

• **Stomata** (in leaves): pores that help in gaseous exchange and transpiration.

• **Root hair:** increases the surface area for absorption of water and minerals.

Q14 **[2 marks]**

Option A:

Step 1 (1 mark): The cells are thin and flat and form only one layer.

Step 2 (1 mark): This allows rapid diffusion of liquids and gases across the lining (exchange function).

Option B:

Bone (1 mark): rigid matrix containing calcium and phosphorus compounds; gives strength and rigidity.

Cartilage (1 mark): soft, jelly-like matrix; gives flexibility and cushions the ends of bones.

SECTION C – Short Answer Questions (3 marks each)

Q15 **[3 marks]**

Any three points (1 mark each):

• Substance transported: xylem carries water and minerals from roots; phloem carries food from the leaves.

• Components: xylem has tracheids, vessels, xylem parenchyma and xylem fibres; phloem has sieve tubes, companion cells, phloem parenchyma and phloem fibres.

• Living or dead: xylem is mostly dead (only xylem parenchyma is living); phloem is mostly made of living cells.

• Extra role: xylem also gives strength to the plant; companion cells regulate loading and unloading of sugars in sieve tubes.

Q16 **[3 marks]**

(i) (1 mark) P = dendrites, R = axon.

(ii) (1 mark) Dendrites (P) receive signals from other neurons; the axon (R), ending in axon terminals (S), carries messages away from the cell body.

(iii) (1 mark) Nervous tissue. It forms the body's control and coordination network; neurons receive, process and transmit messages.

Q17 **[3 marks]**

Option A:

• (1 mark) **Apical meristem:** at the tips of roots and shoots; increases the length of the plant.

• (1 mark) **Lateral meristem:** arranged in a ring along the circumference of the stem; increases girth (thickness).

• (1 mark) **Intercalary meristem:** at the base of internodes (above the node), as in grasses; helps regrowth after cutting.

Option B:

• (1 mark) **Skeletal muscle:** voluntary; attached to bones; long, cylindrical, unbranched, multinucleate and striated.

• (1 mark) **Smooth muscle:** involuntary; found in organs such as the stomach and intestines; spindle-shaped cells with a single nucleus and no striations.

• (1 mark) **Cardiac muscle:** involuntary; found only in the heart; cylindrical, branched fibres with a single nucleus and faint striations; works without fatigue.

SECTION D – Case-Based Questions (4 marks each)

Q18 **[4 marks]**

(i) (1 mark) Volume of plasma = 55% of 20 mL = (55 ÷ 100) × 20 = **11 mL**.

(ii) (1 mark) Volume of formed elements = 45% of 20 mL = (45 ÷ 100) × 20 = **9 mL**. (Check: 11 + 9 = 20 mL.)

(iii) (1 mark) Platelets.

(iv) (1 mark) WBCs collect at the infected area, causing pus formation and inflammation. The area turns red and swollen.

Q19 **[4 marks]**

(i) (1 mark) A = **fixed joint**. The skull bones are joined together and cannot move, which keeps the brain safe even when the body moves.

(ii) (1 mark) B = **ball and socket joint**. It allows forward, backward, sideways and circular movements.

(iii) (1 mark) C = **hinge joint**. It moves in only **one direction** (bends and straightens like a door hinge).

(iv) (1 mark) D = **pivot joint**.

SECTION E – Long Answer Question (5 marks)

Q20 **[5 marks]**

Option A:

(i) (1 mark) Q = tendon, R = ligament.

(ii) (1 mark) A tendon connects muscle to bone and brings about movement; a ligament connects bone to bone, provides stability, limits movement and helps prevent dislocation.

(iii) (1 mark) S = cartilage. It provides flexibility and cushions the ends of bones for shock absorption.

(iv) (1 mark) The knee has a **hinge joint**. It moves in only one direction (like a door hinge).

(v) (1 mark) P is a **skeletal muscle**. Its movements are **voluntary**.

Option B:

(i) (1 mark) When muscle P contracts, tendon Q transmits the force to the bone, resulting in movement at the joint.

(ii) (1 mark) Nervous tissue. Muscles receive instructions from the nervous tissue; the musculoskeletal system works under its control.

(iii) (1 mark) The joint may move beyond its limit and the bones could get dislocated, because ligaments limit movement and give stability.

(iv) (1 mark) T is the kneecap; it protects the knee joint.

(v) (1 mark) Bone has a rigid matrix with calcium and phosphorus compounds (strength and rigidity); cartilage has a soft, jelly-like matrix (flexibility and cushioning).

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