

(iii) What can you say about the pressure potential of this cell compared to the cell immersed in pure water

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2025 AL

Unit 4

Paper 1



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Exhilarating Experience in Biology

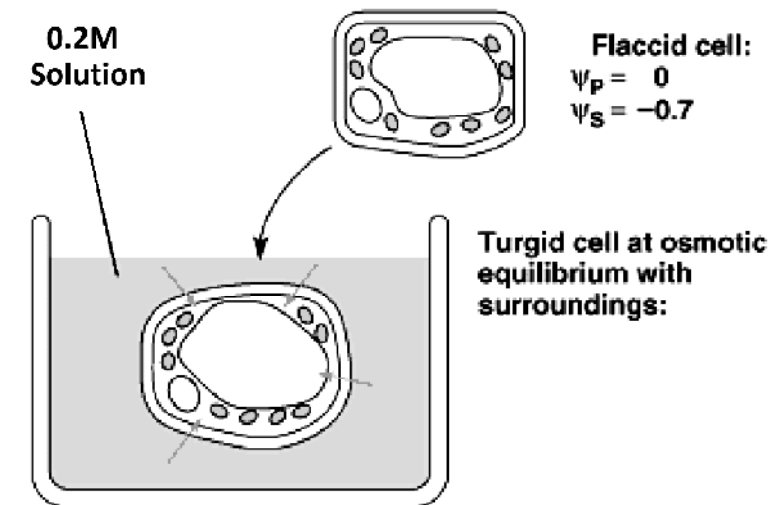
1. Which characteristic of meristematic cells is incorrect?
(1) Isodiametric shape (2) Dense cytoplasm (3) Prominent vacuoles (4) Thin cell walls
(5) High division rate
2. Regarding lateral meristems, which statement is correct?
(1) They are found in root tips (2) They produce only phloem
(3) They include vascular and cork cambium (4) They are responsible for primary growth
(5) They are active only in herbs
3. Match the tissue with its incorrect characteristic:
(1) Parenchyma - thin primary walls (2) Collenchyma - provides flexible support
(3) Sclerenchyma - living at maturity (4) Xylem - conducts water
(5) Phloem - transports sugars
4. Which sequence correctly represents water movement in roots?
(1) Epidermis → cortex → endodermis → xylem
(2) Epidermis → endodermis → cortex → xylem
(3) Cortex → epidermis → endodermis → xylem
(4) Endodermis → cortex → epidermis → xylem
(5) Epidermis → xylem → cortex → endodermis
5. In the radial transport pathway, which route allows selective transport?
(1) Apoplastic only (2) Symplastic only (3) Transmembrane only
(4) Both symplastic and transmembrane (5) All three routes
6. The water potential equation ($\Psi = \Psi_s + \Psi_p$) indicates that:
(1) Solute potential is always positive (2) Pressure potential is always negative
(3) Total potential is the difference of components (4) Components are always additive
(5) Components are always equal
7. A wilted cell would show:
(1) Positive Ψ_p , negative Ψ_s (2) Zero Ψ_p , negative Ψ_s (3) Negative Ψ_p , zero Ψ_s
(4) Positive Ψ_p , positive Ψ_s (5) Zero Ψ_p , zero Ψ_s
8. Which is essential for long-distance water transport in xylem?
(1) Active transport only (2) Root pressure only (3) Cohesion-tension only
(4) Both root pressure and cohesion-tension (5) Neither root pressure nor cohesion-tension
9. Identify the incorrect matching:
(1) Apoplast - cell walls and intercellular spaces
(2) Symplast - cytoplasmic continuum (3) Casparian strip - blocks apoplastic transport
(4) Aquaporins - facilitate water movement (5) Plasmodesmata - block symplastic transport

10. In phloem transport, what drives movement from source to sink?
 (1) Water potential gradient only (2) Pressure flow only (3) Active transport only (4) Combination of pressure flow and active loading (5) Diffusion only
11. Which plant hormone shows opposite effects at different concentrations?
 (1) Gibberellin (2) Cytokinin (3) Auxin (4) Ethylene (5) ABA
12. The triple response to ethylene includes:
 (1) Enhanced shoot elongation (2) Reduced root growth only (3) Horizontal growth only (4) Both horizontal growth and reduced elongation (5) Enhanced root growth only
13. What distinguishes plant growth regulators from animal hormones?
 (1) Site of action (2) Chemical nature (3) Transport mechanism (4) Concentration required (5) All of these
14. For cell elongation to occur, which sequence is correct?
 (1) Wall loosening → water uptake → increased turgor
 (2) Water uptake → wall loosening → increased turgor
 (3) Increased turgor → wall loosening → water uptake
 (4) Wall loosening → increased turgor → water uptake
 (5) Water uptake → increased turgor → wall loosening
15. Auxin transport in stems is:
 (1) Bidirectional through phloem (2) Basipetal only (3) Acropetal only
 (4) Polar and basipetal (5) Non-polar and bidirectional
16. Phototropism involves:
 (1) Equal auxin distribution (2) Higher auxin on illuminated side
 (3) Higher auxin on shaded side (4) No auxin involvement (5) Auxin inhibition
17. In gravitropism of roots, statolith sedimentation:
 (1) Directly causes bending (2) Triggers calcium redistribution (3) Has no role in response
 (4) Inhibits auxin transport (5) Enhances ethylene production
18. Phytochrome responses include all except:
 (1) Seed germination (2) Shade avoidance (3) Flowering time (4) Gravitropism (5) De-etiolation
19. A plant showing enhanced stem elongation in shade likely has:
 (1) High Pr/Pfr ratio (2) Low Pr/Pfr ratio (3) Equal Pr/Pfr ratio
 (4) No phytochrome involvement (5) Complete phytochrome degradation
20. During drought stress, ABA:
 (1) Promotes stomatal opening (2) Increases transpiration (3) Induces stomatal closure
 (4) Has no effect on stomata (5) Degrades guard cells
21. Cold acclimation involves:
 (1) Increased membrane saturation (2) Decreased membrane fluidity
 (3) Reduced solute concentration (4) Increased water content
 (5) Membrane protein degradation

22. The correct sequence for thigmotropism is:
 (1) Touch → Ca²⁺ influx → gene expression → growth response
 (2) Touch → gene expression → Ca²⁺ influx → growth response
 (3) Ca²⁺ influx → touch → gene expression → growth response
 (4) Gene expression → touch → Ca²⁺ influx → growth response
 (5) Growth response → touch → Ca²⁺ influx → gene expression
23. Salt stress adaptation includes:
 (1) Decreased osmolyte production (2) Enhanced water uptake (3) Reduced ion transport
 (4) Ion compartmentalization (5) Increased membrane permeability
24. Pre-existing defense mechanisms include all except:
 (1) Trichomes (2) Thorns (3) Pathogenesis-related proteins (4) Thick cuticle (5) Alkaloids
25. Plant stress response shows cross-tolerance because:
 (1) All stresses cause similar damage (2) Plants have limited response options
 (3) Common signalling pathways exist (4) Stress responses are random
 (5) Plants cannot distinguish stresses

Structured essay

1. Given flaccid plant cell immersed in 0.2 M solution. Assume 0.1 M solution has solute potential of -0.24 MPa.



- (i) Calculate the water potential of the cell at equilibrium.

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- (ii) Calculate the pressure potential of the cell at equilibrium

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