**2017**

(a) (i) Name the vascular tissue through which the products of photosynthesis are transported in plants.

(ii) Give two structural features of the tissue referred to in (i).

**(9)**

1. The graph shows the relationship between the rate of transpiration and the rate of water uptake for a particular plant on a fine summer day.

* 1. Describe the relationship between the rate of transpiration and the rate of water uptake during the day. Suggest a reason for this relationship.
	2. Under what **two** conditions does the highest rate of transpiration occur on that day?
	3. Name the cells which control the opening and closing of stomata.
	4. What is the advantage to plants of having most of their stomata on the underside of the leaves?
	5. Give a disadvantage to plants of a high rate of transpiration.
	6. What do plants do in response to the disadvantage referred to in (v)?
	7. Name **both** Irish scientists who proposed the theory of water movement in plants.

**MS 2017 11**

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| **11.** | (a) | (i) | *Vascular tissue that transports photosynthesis products:* |  |
|  |  |  | \*Phloem | **3** |
|  |  | (ii) | *Structural features of phloem:* |  |
|  |  |  | Sieve tubes (or sieve tube elements)/ companion cells/ sieve plates/cytoplasm pushed to edges ***Any two*** | **2(3)** |
|  | (b) |  | **3(4) + 3(3) + 3(2)** |  |
|  |  | (i) | *Relationship between rates of transpiration and water uptake:* |  |
|  |  |  | As water uptake increases (or decreases) transpiration also increases(or decreases) **or** both increase (or decrease) at the same time (or together) |  |
|  |  |  | *Reason for relationship:* |  |
|  |  |  | High water uptake makes more water available for transpiration **or** high transpiration allows more water to be taken in (to replace water lost) |  |
|  |  | (ii) | *Conditions for highest transpiration rate:* |  |
|  |  |  | Hottest (or warmest or highest temperature) |  |
|  |  |  | Brightest **or** sunniest |  |
|  |  | (iii) | *Cells controlling stomata:* |  |
|  |  |  | \*Guard cells |  |
|  |  | (iv) | *Advantage of stomata underneath:* |  |
|  |  |  | Reduces water loss by transpiration **or** reduces water loss byevaporation |  |
|  |  | (v) | *Disadvantage of high transpiration rate:* |  |
|  |  |  | Wilting (or described) |  |
|  |  | (vi) | *Plant response to (v):* |  |
|  |  |  | Close stomata **or** stomata reduce in size |  |
|  |  | (vii) | *Irish scientists:* |  |
|  |  |  | Dixon **and** Joly |  |
|  | (c) |  | **3(4) + 2(3) + 3(2)** |  |
|  |  | (i) | *Vegetative propagation:* |  |
|  |  |  | (Plant) asexual reproduction **or** explained |  |
|  |  | (ii) | *Features of vegetative propagation* |  |
|  |  |  | No gametes (or no seeds)/ one parent/ no variation (or identical offspring) ***Any two*** |  |
|  |  | (iii) | *Natural vegetative propagation – leaf:* |  |
|  |  |  | e.g. Begonia **or** other valid |  |
|  |  |  | *Natural vegetative propagation – bud:* |  |
|  |  |  | Bulb (or named example) |  |
|  |  | (iv) | *Artificial vegetative propagation:* |  |
|  |  |  | Tissue culture/ cuttings/ grafting/ layering / budding ***Any two*** |  |
|  |  |  | *Benefit of artificial vegetative propagation:* |  |
|  |  | (v) | Rapid **or** more reliable **or** desirable characteristics maintained |  |

**Q 2014 14 c**

(i) Explain how water enters root hairs and then passes to the vascular tissue.

1. In which of the vascular tissues will water now rise through the plant?
2. Give **two** features of the tissue referred to in (ii) that facilitate this upward movement of water.
3. Name **and** briefly explain any **two** processes involved in the upward movement of water in plants.

**MS 2014 14 c**

|  |  |  |  |
| --- | --- | --- | --- |
| (c) | (i) | Osmosis / soil water more dilute **or** cytoplasm of the root cells more |  |
|  |  | concentrated / cell to cell (by osmosis) | **3(3)** |
|  | (ii) | \*Xylem |  | **3** |
|  | (iii) | Narrow / continuous tube (no end walls or open ended) **or** pits / |  |
|  |  | no cell contents / attraction of H2O to walls / thick wall | **2(3)** |
|  | (iv) | Root pressure / transpiration / adhesion / cohesion | **2(3)** |
|  |  | Two explanations: |  |
|  |  | *Root pressure:* | H2O in pushes H2O up |  |
|  |  | *Transpiration:* | H2O out pulls H2O up (or creates tension) |  |
|  |  | *Adhesion:* | H2O attracted to walls |  |
|  |  | *Cohesion:* | H2O (molecules) attracted to each other **or** allows |  |
|  |  |  | continuous stream | **2(3)** |

 **Q 2011 15 b**

(i) Name the tissue in plant stems through which water rises to the leaves.

1. Give **one** way in which this tissue is adapted for the transport of water.
2. Give a precise location of this tissue in the stem.
3. State another function of the tissue referred to in (i).
4. The cohesion-tension model of transport attempts to explain water movement in plants against a particular force. Name this force.
5. Describe the principal features of the cohesion-tension model.
6. Name the two scientists mainly associated with the cohesion-tension model of transport.

**MS 2011 15 b**

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| **15.** | (b) | (i) | \*Xylem | **3** |
|  |  | (ii) | Narrow **or** lignified (or rigid) **or** continuous lumen **or** wettable | **3** |
|  |  | (iii) | In vascular bundles **or** next to phloem | **3** |
|  |  | (iv) | Support **or** other transport function | **3** |
|  |  | (v) | \*Gravity | **3** |
|  |  | (vi) | Water (molecules) stick together / (due to) H-bonding / continuous chain (of water molecules) / water tends to adhere to xylem walls / transpiration (or water loss) ‘pulls’ (the column of) water up ***Any three*** | **3(3)** |
|  |  | (vii) | \*Dixon\*Joly | **3****3** |

 **Q 2008 14 c**

(i) Draw a large labelled diagram of a transverse section through a young root.

1. Water enters the outermost cells of the root by osmosis. What does this tell you about the cell sap of these outermost cells?
2. Osmosis has been described as a special case of diffusion. Explain why.
3. Describe an investigation that you carried out to demonstrate osmosis.
4. Describe how minerals such as nitrates enter the root of a plant from the soil.

**MS 2008 14 c**

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| --- | --- | --- | --- |
| (c) | (i) | Diagram | **3, 0** |
|  |  | Labels: dermal tissue, ground tissue, vascular tissue [*accept* xylem **or** |  |
|  |  | phloem for vascular] | **3(2)** |
|  | (ii) | lower water concentration **or** higher solute concentration | **3** |
|  | (iii) | movement of water (solvent) / along concentration gradient / through a selectively permeable membrane | **2(3)** |
|  | (iv) | membrane **or** plant tissue / 2 solutions indicated/ different concentrations / result | **3(3)** |
|  | (v) | diffusion **or** passive transport | **3** |

 **Q 2005 14 a**

* 1. The passage of water through a plant is known as the transpiration stream. Answer the following questions in relation to the transpiration stream.
		1. Explain how water enters the plant at the root hair.
		2. Do minerals enter the plant by the process that you have indicated in (i)? Explain your answer.
		3. How is xylem adapted for its role in water transport?
		4. Strong forces of attraction exist between water molecules. Give an account of the importance of these forces in raising water to great height in trees.

**MS 2005 14 a**

 (i) Osmosis / reference to different concentrations / membrane partially (selectively) permeable / comment on surface area of root hair(s) or no cuticle present

any three **3(3)**

1. No **3**

Only water (solvent) moves by osmosis or other correct comment **3**

1. Tubular or continuous lumen / reinforced (lignified) walls / end to end / pits / lateral movement of water / wettable lining / narrow (bore)

any two **2(3)**

1. (called) cohesion / water evaporates in leaf or transpiration / is replaced / upward pull or tension /continuous stream / ensures movement / water column hard to break any three **3(3)**