

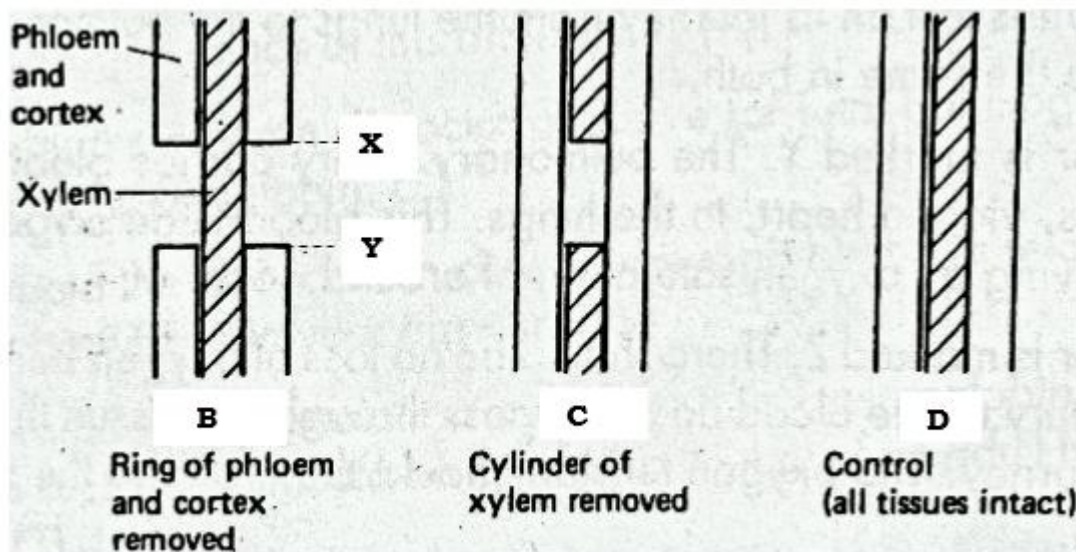
S.6 BIOLOGY (P530/1)
1Hour 30 Minutes

Instructions

Attempt **all** questions in this paper.

Precise and sequential presentation of answers is required of candidates

- In an experiment to determine which tissue conducts sugar through the stem,
 - Leaves were removed from the upper region of the plant
 - A ring of all tissues outside the xylem was removed at the base of the defoliated regions
 - A cylinder of xylem was removed from the stem at the base of the defoliated region. Other tissues were intact except for a small cut through which the xylem was removed.
 - All tissues were left intact(control)



The cylinders were then filled with fresh distilled water each day and left to stand for a week. The results are as shown below.

	B	C	D
Increase in length of stem(mm)	5.3	51.6	65.9
Total sugar concentration of the stem above the region, X-Y in mg	0.06	6.43	3.36

(a) Why were the following procedures carried out?

- (i) Removal of leaves from the upper parts of the stem. (1mark)

**To stop further manufacture of sugars by leaves/photosynthesis;✓
allowing only uni-directional translocation of sugars from below over
the experimental region, X-Y;✓ @ ½ mark**

- (ii) Enclosing the stems in a glass tube containing distilled water. (1mark)

**To prevent drying out/desiccation of the now exposed internal
tissues;✓✓ @ ½ mark**

(b) Account for the results between

- (i) B and C (2marks)

**Extent of growth/increase in length of stem and amount of sugar
above experimental region, in C are considerably higher than in B;✓
because phloem and cortex carry much more of the sugars than the
xylem;✓ @ 1mark**

- (ii) C and D (4marks)

**Extent of growth/increase in length of stem in D (control) is higher
than in C;✓ because the xylem carries some materials (water and
dissolved minerals) necessary for growth;✓
Amount of sugar above the experimental region, X-Y in D is lower than
in C;✓ because sugars are being oxidized to provide sufficient energy
for extra growth;✓ @ 1mark**

(c) Why is an increase in length of the stem not a particularly good
measure of translocation? (1marks)

**Not only sugars are essential for growth of stems; /Other substances
other than sugars are essential for growth of stems;✓**

(d) Give **two** other evidences that support translocation of photosynthetic
products in plants. (1mark)

**Radioactive tracer technique/Radioisotope labelling;✓
Feeding Aphid experiment;✓ @ ½ mark**

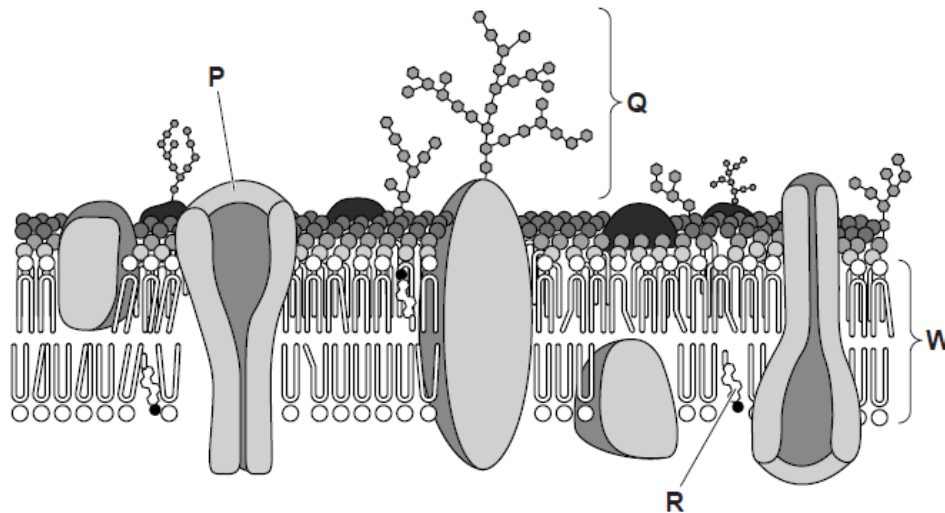
2. (a) Membranes such as the cell surface membrane are described as having the fluid mosaic structure. Explain what is meant by the term **fluid mosaic**. (3marks)

Fluid; *Individual phospholipid (and protein) molecules;✓✓ move about within their monolayer/monomolecular film;✓*
Acc occasionally move laterally/sideways/ 'flip flop'(move transversely)

Mosaic ; *Proteins molecules occurring in the phospholipid bilayer;✓ vary in size, shape;✓ and are scattered(vary in pattern of arrangement);✓*

@ ½ mark

- (b) Figure below shows section of a cell surface membrane.



- (i) Identify structures **P**, **Q**, **R**, and **W** (2marks)

P: *Transmembrane/channel/intrinsic/integral protein;✓*

Q: *Glycoprotein/Glycocalyx;✓*

R: *Cholesterol;✓*

W: *Phospholipid bilayer;✓*

@ ½ mark

- (ii) State the functions of structures **P** and **Q**. (2marks)

P: *Transports polar substances (hydrophilic molecules and ions) through the membrane(in and out of cells);✓*

Q:- *Recognition site for hormones and neurotransmitter substances;✓*

- *Cell to cell recognition/Allow cells recognise one another e.g. lymphocytes recognise an organism's own cells;*

- *(Similar) cells attach to one another forming tissues;/cell adhesion;*

- *Antigens in immunity;*

-Stabilises the membrane;(Owing to formation of hydrogen bonds with water) Award for any one correct function.

(c) How is membrane fluidity essential to cell functioning? **(3marks)**

Gives membrane a flexible structure;✓ allowing invagination/infolding and self sealing(changing of shape);✓ during endocytosis (Pinocytosis/phagocytosis);✓ and exocytosis;✓ Max 3
Rej. Description of endocytosis(phagocytosis/pinocytosis), exocytosis.

3. (a) What is meant by the term **non-disjunction**? **(2marks)**

Non-separation/segregation of one or more homologous chromosomes into different gametes during meiosis;✓✓

(b) Down's syndrome is one of the genetic abnormalities resulting from non-disjunction. The table below shows the effect of mother's age on the incidence of Down's syndrome.

Age of mother(years)	Incidence of Down's syndrome
20	1 in every 2000 births
30	1 in every 900births
40	1 in every 100births
45	1 in every 40 births

(i) Explain the relationship between the mother's age and incidence of Down's syndrome. **(2marks)**

As the age of the mother increases, incidence of Down's syndrome increases;✓✓ ova formed during embryonic stage becomes older;✓ thus much more prone to error/non-separation of chromosome 21;✓ @ ½ mark

(ii) Outline **four** symptoms of Down's syndrome. **(2marks)**

Mental retardation;✓ Round flat face;✓ Reduced resistance to infection(especially respiratory and ear infections);✓ Protruding tongue;✓ slit eyed appearance;✓ short body with stubby fingers/short stature);✓ Hear defects;✓ Any correct four @ ½ mark

(iii) Give **two** prenatal diagnostic tests commonly used to detect Down's syndrome. **(2marks)**

Amniocentesis;✓ Chorionic Vilus sampling(CVS);✓ Acc Transabdominal/Transcervical sampling; for CVS;

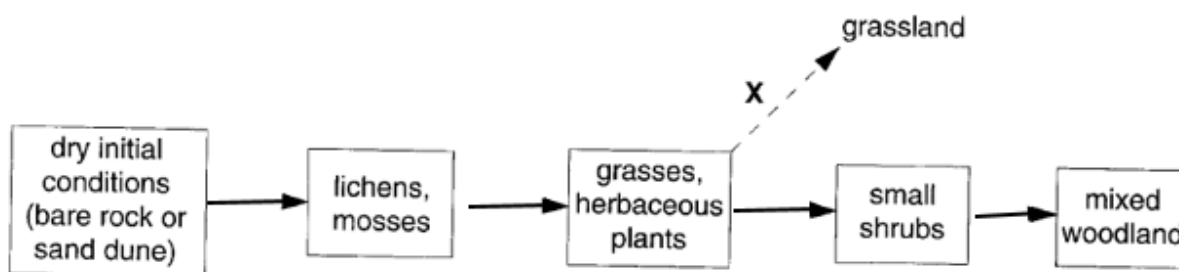
- (c) Other than Down's syndrome, what other genetic abnormalities can be caused by non-disjunction? **(2marks)**

Klinefelter's syndrome; ✓ Turner's syndrome/Monosomy X; ✓ Patau syndrome/Trisomy 13; ✓ Edwards Syndrome/Trisomy 18; ✓ Ref Mosaicism.

Any two @ 1mark

4. The figure below shows a primary succession in a temperate climate.

X represents an example of deflected succession.



- (a) (i) Outline **two** characteristic features of a deflected succession.

(2marks)

Original climax community is not reached; ✓ Relatively stable community (plagioclimax) results from human interferences; ✓ @ 1mark

- (ii). Suggest how deflected succession **X** could be caused. **(2marks)**

Grazing by animals; ✓

Controlled burning; ✓

Mowing; ✓

Water drainage; ✓

Weeding/coppicing; ✓

Application of selective herbicide; ✓

Deforestation; ✓ Any correct four

@ ½ mark

- (b) Explain the role of pioneer plants in succession on a bare rock or sand dune. **(3marks)**

Secretion of acids that break down rocks into small pieces; ✓

Decomposition adds more organic matter/humus; to the small pieces of rock forming soil; ✓

Fixation of nitrogen into new soils; ✓

Some form dense mat that traps tiny particles of rocks, bits of organic debris and water; ✓

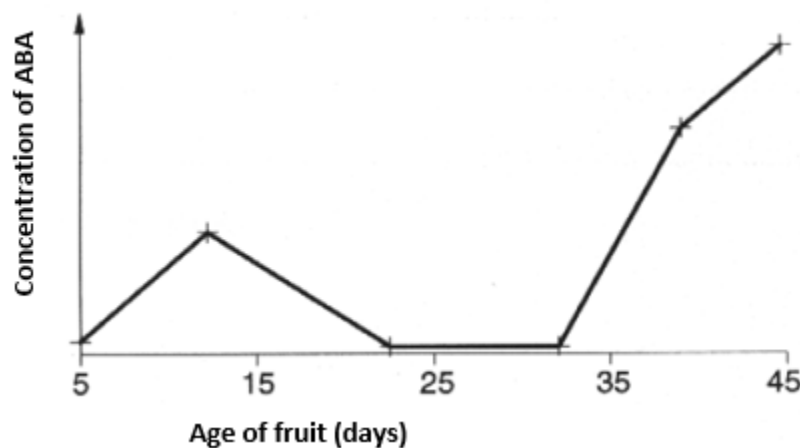
Form micro habitats for insects and other small animals; ✓ by creating more organic matter on death, and decay; ✓

Change soil pH; ✓ Any correct three @ 1mark

(c) Explain how biomass change during a primary succession. (3marks)

Increases; ✓ plants (shrubs and trees) at later stages are larger than those in earlier stages (seres); ✓ with more developed roots; ✓ leaves; and more wood; ✓ @ 1mark

5. The graph in the figure below shows the concentration of abscisic acid, ABA as cotton fruit develops. Study it carefully and answer the questions that follow.



(a) Describe the relationship between fruit development and ABA concentration. (3marks)

As age of fruit increases between 5 days and about 13 days, ABA concentration increases rapidly; ✓

As age of fruit increases between 13 days and 23 days, ABA concentration decreases rapidly; ✓

As age of fruit increases between 23 days and about 33 days, ABA concentration is low and remains constant; ✓

As age of fruit increases between 33 days and 45 days, ABA concentration increases rapidly; ✓ Any three, @ 1mark

(b) Of what significance are the changes in ABA concentration in the following period of time?

(i) 5-23 days (2marks)

ABA concentration increases rapidly to a peak; ✓✓ to stimulate fall/dropping/abscission of some immature fruits; ✓ so as to maximise nutrients needed for maturity remaining fruits; ✓ @ 1/2 mark

- (ii) 33-45days (1mark)

ABA concentration increases rapidly to a peak;✓ to stimulate fall/dropping/abscission of already mature/ripe fruits;✓ @ ½ mark

- (c) Suggest a way in which ABA acts within cells to bring about changes. (2marks)

Binds on cell surface receptors;✓ inhibiting hydrogen ion(proton) pumps/protons are not pumped out;✓ Stimulates a metabolic pump to actively secrete potassium ions out of guard cells;✓✓ @ ½ mark

OR

Diffuses to nucleus; acts on genetic material; enzymes are synthesised; catalyse breakdown of middle lamella of cells; Rej details of stomatal closure by abscisic acid.

- (d) Outline the significance of the increase in concentration of ABA in leaves in hot dry weather. (2marks)

Excessive transpirational water loss occurs;✓ plants are under water stress/ are dehydrated;✓ thus stomata need to close;✓ to lower the rate of transpiration;✓ subsequently preventing wilting;✓ @ ½ mark

6. (a) What is an **epithelial tissue**? (2marks)

Are animal tissues consisting of single or many (numerous) layer(s) of cells; held together by small amounts of intercellular substances and special junctions(connecting bridges of cytoplasm); covering the internal(organs, cavities and tubes) and external surfaces of organism's body;✓✓

- (b) Giving **one** example where each is found, how are the following animal tissues suited for their functions?

- (i) Stratified tissue. (03marks)

Consists of many layers of cells;✓ it's tough;✓ impervious/impermeable;✓ and in some cells its keratinized/cornified;✓ for protection against abrasion;✓ in the epidermis of skin;✓ vagina; and lining of the buccal cavity; Repetitive mitotic division of cells of the germinal layer;✓ replace the older cells that flake off at the surface;✓ In theUrinary bladder;✓ cells retain the ability to stretch/change shape;✓ thus allowing it to expand accommodating larger volumes of urine;✓ @ ½ mark

(ii) Elastic tissue.

(3marks)

***Consists of elastic fibres;✓ flexible;✓ and highly elastic(stretchable);✓
permitting tissues to recover shape quickly on distortion;✓ e.g. in
the Larger arteries,✓ Alveoli of lungs;✓ external ear, and nose;
Elastic fibres are also strong;✓ allowing binding of bones together
at the ligaments;✓*** @ ½ mark

(c) What are the different categories in which glands are classified?

(2marks)

***Kinds of secretion, presence and absence of ducts;✓ e.g Endocrine
and exocrine glands;
Number of cells;✓ e.g. Unicellular and multicellular gland;
Form of secretion;✓ e.g. Mucous(Mucocytes), serous(Serocytes) and
Mixed glands;
Manner of discharge;✓ (Apocrine, Holocrine and Ecrine(Merocrine)
glands;***

@ 1mark

END