

SECTION B (60 MARKS)

41. (a) What is meant by the term compensation point? (02 marks)
Point at which rate of Resp = Rate of Photosynthesis in plant (02)

(b) Account for the relevance of the leaf anatomical difference between C_4 and C_3 plants. (04 marks)
In C_4 plants bundle sheath cells are arranged in a ring around vascular bundles, while in C_3 plants they are arranged in a line. This is to reduce the occurrence of photorespiration since B.S.C with Rubp is hidden away from easy reach of Oxygen. (04)

(c) Figure 2 below shows interconversions of absorbed food products in a human body. Study it carefully and answer the questions that follow.

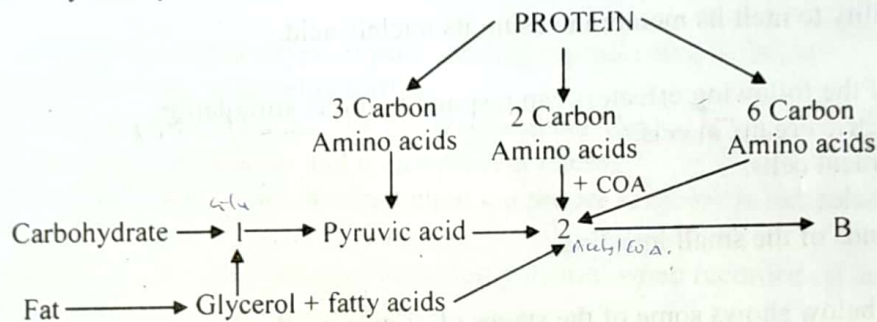


Fig. 2

(i) Name compounds 1, 2 and pathway B. (01½ marks)

1 *Glucose*
 2 *Acetyl CoA*
 B *Krebs' cycle*

(ii) Explain the importance of pathway B. (02½ marks)

*- Forms ATP (2) chemical energy used in metabolism
 - Generates NADH₂ and FADH₂ (2). This makes NAD⁺ and FAD available to accept more H atoms in ETS process that generates more ATP.* (02½)

42. (a) Describe the following terms in relation to DNA.

(i) Double helix (03 marks)

DNA is made up of 2 polynucleotide strands which are helical (spiral) shaped. (03)

(ii) Semi conservative replication (02 marks)

Is type of replication whereby the two daughter DNA molecules contain half of parent DNA and half new DNA. (02)

- (b) Chemical analysis of a sample of DNA extracted from a cell shows that 38% of bases are adenine. What percentage of the bases is guanine? (02 marks)

$AT = 38 + 38 = 76\%$
 $GC = 100 - 76 = 24\%$
 $Guanine = \frac{24}{2} = 12\%$ (02)

- (c) Discuss why linkage does not lead to variation and consequently evolution of new species. (03 marks)

Linked genes from a linkage group pass into same gamete dip most as group, they have don't show independent assortment, hence lead not to variation! (03)

3. (a) (i) What is an after ripening period? (02 marks)

Is period taken by the seed to undergo certain internal changes before they germinate to ensure premature germination does not occur. (02)

- (ii) State four changes that occur in a seed during after ripening. (04 marks)

- (b) Explain why seeds of certain plants only germinate when exposed to light. (4 marks)

These plants are photoblastic; (grow in light). They have pigments that called phytochrome which absorb light that stimulate growth; this can be done cause in the in gibberellin levels in the seed, a hormone that is responsible for synthesis of hydrolytic enzymes need for germination. (04)

4. Sickle-cell disease is a prime example of genetic pleiotropy, a condition resulting from hereditary haemoglobin defects that occur among people of African descent.

- (a) (i) How does the structure of sickle-cell haemoglobin (HbS) differ from normal haemoglobin (HbA). (02 marks)

Sickle cell haemoglobin is rod-shaped (rod-like fibres) unlike normal tetrahedral shape of normal haemoglobin. (02)

- (ii) Explain why the erythrocytes of a person suffering from sickle cell anaemia appear curved and pointed at the ends. (02 marks)

It is because the abnormal haemoglobin present in people with S.C anaemia is rod shaped (rod-like fibres) which disturbs the normal biconcave shape of RBC. (02)

Turn Over

- (iii) List any other 2 symptoms exhibited by a person with sickle-cell anaemia. (01 marks)

Fatigue, - Shortage of Breath
 Poor Physical fit - Heart failure, lung damage
 Dilatation of Heart, am 2. Over time.

- (b) (i) Describe the structure of a haemoglobin molecule. (03 marks)

Has 4 polypeptide chains (globin structure) around 4 haem groups. 2 of these chains are coded to form α -helix; and other β -chains. Folding maintained by many chemical bonds and electrostatic attraction; being compacted. It contains prosthetic group; central iron atom held by ring of 4 atoms which are part of porphyrin ring.

- (ii) Suggest why the affinity of haemoglobin for oxygen increases drastically after combining with oxygen. (02 marks)

It's because after combining with 1st O_2 molecule, it distorts shape of haemoglobin, hence causing the other 3 haem groups combine with O_2 with ease.

45. (a) (i) Distinguish between water potential and solute potential. (02 marks)

Water potential is tendency of system to donate water to its surroundings, tendency of water to leave system while solute potential is measure of change (reduction) in water potential (free water) due to presence of dissolved solute molecules.

- (b) Figure 4 shows the variation of water potential, solute potential and pressure potential in a plant cell immersed in pure water. Study the figure and answer the question that follow.

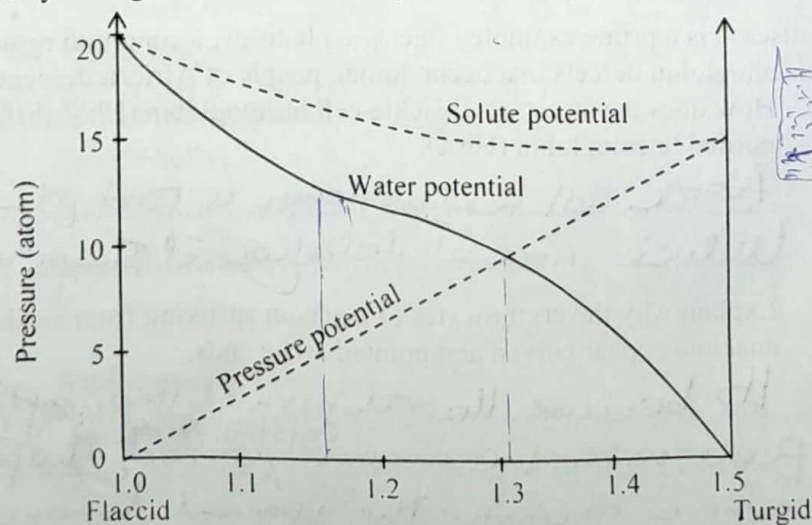


Fig. 4

Describe;

(i) The changes in water potential.

(03 marks)

Water potential initially decreased rapidly, then decreased gradually and finally decreased rapidly.

03

(ii) The relationship between pressure potential and solute potential.

(02 marks)

As the pressure potential decreases steadily, the solute potential initially decreases gradually, then remains almost constant.

02

(c) Explain the relationship between solute potential and water potential. (03 marks)

Pure water is hypotonic to plant cells, hence water moves by osmosis from water to plant cell. Since water is entering plant cell instead of leaving, the water potential of plant cell decreases, however entry of water into plant cell (reducing water potential) causes over dilution of solutes in plant cell hence drop in solute potential.

03

6. (a) What is meant by the term Action potential?

(02 marks)

Is an potential difference across membrane of neuron that is beyond the threshold; it is a membrane potential of an excited neuron.

02

(b) State the differences between Somatic and Autonomic Nervous system.

(04 marks)

Somatic	Autonomic
Stimulated voluntarily	Involuntary & stimulated
Input is from sense organs	Input from internal receptors
Output is to skeletal muscles	Output is to smooth muscles & glands
Not subdivided	Is subdivided into Parasympathetic & Sympathetic n.s

04

(c) Explain the following observations.

- (i) Parasympathetic nervous division affects target organs more selectively than the sympathetic division. (02 marks)

~~Because Sympathetic division controls blood vessel, we are spread throughout entire body compared to Parasymp that controls a few parts like gut; longer preganglionic fibers that reach target~~

- (ii) Somatic motor fibers have faster conduction speeds than autonomic post ganglionic nerve fibres. (02 marks)

~~Have many myelin sheaths~~

~~Somatic motor fibres are myelinated while the a.p.g.n. fibres are non myelinated.~~

END

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