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- b) - Cavities of long bones have struts to give strength to resist breakage.
- Wing bone / fore arm / limb is elongated and fused to provide supportive structures for the attachment of flight muscles.
- have contour feathers to provide body cover / insulation against heat loss during flight.
- Have pectoral girdles which are strong to provide firm bases for wings. Have streamlined bodies for reduced resistance to air during flight.
- Have long keel / sternum for increased surface area for attachment of flight muscle.
- Have hollow bones for reduced body weight.
- The fore limbs are modified into wings for flight.
- Have cavities in hollow bones filled with air sacs to improve ventilation in birds by supplying the lungs with fresh air during inspiration and expiration.
- Strong flight muscles; Pectoralis and major and minor for movement of wings. Any 8, PA 8 marks.

Total 20 marks

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Graz Amoeba uses a Pseudopodium for locomotion. For forward locomotion to occur, the Pseudopodium is formed anteriorly where the endoplasm flows forward with the Pseudopodium formed by a process of cytoplasmic streaming. In the Pseudopodium the Plasmol is converted to a more rigid fluid Plasma gel which flows backwards as it provides support to the posterior end along the ectoplasm and then converted into Plasma sol by a process called Solation. Flowing plasma sol endoplasm to anterior allows the posterior to be pulled forward.

The Cilia locomotion is used by Paramecium. The forward movement involves beating of the cilia back wards to effective stroke where the cilia extend and become rigid to exert more resistance on the medium to thrust force to generate propulsive forward force.

The locomotion by flagella occurs in Euglena. It involves flagellar movements in a wave like motion (undulating movements) which spread from the base up to the tip of flagella exerting a thrust force to cause a forward movement.

Max 12 15



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b. When certain transmitter substance attaches to specific protein receptors on the post-synaptic membrane, the K^+ and Chloride ion gates open while the Na^+ ion gates remain closed. This causes K^+ ions to diffuse rapidly out of the post-synaptic knobs into the cleft while the Cl^- ions diffuse from the cleft into the knob increasing negativity inside making the post-synaptic membrane hyperpolarised resulting in the formation of Inhibitory Post-synaptic potential (IPSP). This prevents the formation of an action potential in the post-synaptic neurone as the threshold value is never attained.

Also transmission is inhibited through accommodation / fatigue where the amount of transmitter substance gradually reduces until exhaustion due to high frequency arriving at the synapse at a rate that doesn't cope with the rate of resynthesis of the same transmitter.

Also presence of inhibiting drugs that prevent the release of transmitter substance or block the specific receptors bind with transmitter substance molecules preventing depolarisation of post-synaptic membrane

MAX 12 MARKS

Time: 2 hours

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5 (a) Similarities:

- In both the rate of is increased due to higher concentrations of CO_2 in blood (low pH)
- In both changes in pH is detected by chemoreceptors in Carotid and Aortic bodies
- In both, the control is by the medulla oblongata.
- (any 4)* In both control is by negative feedback mechanisms of homeostatic control
- In both impulses are transmitted through nerve fibres
- Both involve use of involuntary muscles
- Both receive impulses from stretch receptors

Differences:

Control of Ventilation

- uses respiratory centres in medulla
- involves lungs, diaphragm and intercostal muscles
- Does not involve Sympathetic and Parasympathetic Nervous System

Control of heart rate

- uses Cardiovascular centres in medulla
- involves the heart, cardiac muscle, SA and AVA; Purkinje fibres
- involves Sympathetic and Parasympathetic Nervous System

Q7

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4. (a) Menstrual cycle is a cycle of physiological and structural changes involving interactions of reproductive hormones leading to ovulation and breakdown of endometrium in case of failure or no fertilization to release a period known as a menstrual period.

b) The hypothalamus releases a gonadotrophin releasing hormone (G.R.H.) which stimulates the anterior lobe of pituitary gland to secrete follicle stimulating hormone (F.S.H.). F.S.H causes the growth of a graafian follicle and also stimulates ovarian tissues to secrete Oestrogen which causes further growth of the graafian follicles.

Increased concentration of Oestrogen stimulates the anterior lobe of pituitary gland to secrete luteinizing hormone (L.H.). L.H. Causes ovulation and formation of Corpus luteum. It also causes the secretion of Progesterone from the Corpus luteum.

Progesterone and Oestrogen inhibit the release of F.S.H and L.H which inhibit development of new graafian follicles.

1mk @

Max 14

20

Total marks.

- (c) • Regular use of antibiotics like penicillin may make bacteria produce chemicals / enzymes to neutralise them rendering them non-toxic.
- i. Through mutation, the protein(s) the bacteria can be changed giving rise to new strains with new structures and receptors that can prevent antibiotic molecules from binding and enter into their cells hence making bacteria resistant. These changes can be passed on to the next generation producing resistant varieties. $\frac{2}{2} \text{ marks}$ @ 3 marks
- ii. Some bacteria form relationships with other organisms which have the ability to destroy or neutralise the antibiotics. $\frac{1}{2} \text{ mark}$, well explained 0.3 marks.

Total 21 mark 20 marks.

Few members of population are able to resist when exposed to antibiotic are able to resist its effects. Resistance is acquired through mutation to produce chemical enzyme to neutralise the effect of antibiotic rendering them non-toxic. Regular use of antibiotic accelerate the selection of resistant variants and their proportion in the will increase.

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Independent assortment
of homologous
chromosomes / Segregation
of homologous
chromosomes

at metaphase
is independent
event

08 result
new cont.

3 (a) During Meiosis I in prophase I, the homologous chromosomes through synapsis form bivalents in which there is exchange of non-sister chromatids at chiasmata resulting in crossing over and genetic exchange between the homologous chromosomes giving rise to the recombinants with different characteristics from original parents hence Variation.

imic C to max 08

b. ii Increased population size increases competition for limited environmental resources, and this increased environmental resistance causes those individuals which are less favoured to be selected against and they die while the strong ones are selected for; able to pass on their genes resulting into new species with strong genes, hence speciation.

i. Selective breeding is where humans are exerting selection pressure which leads to changes in allele and genotype frequencies within in the population. This gives rise to new breeds, strains or varieties. This is through out breeding / cross breeding where only the individuals with strong genes are allowed to mate giving rise to hybrids / hybrids / gores / Heterosis. 04 max C 4

15

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Which increases the water potential so that water moves the sieve tubes by osmosis decreasing the hydrostatic pressure. The high hydrostatic pressure in the source and low pressure in the sink creates a pressure gradient which causes the movement of the photosynthetic products in solution in form of mass follow down the pressure gradient ✓

1 mark @ 17 marks max 15

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SECTION B:

2 (a) When the osmotic pressure of the soil is high, the plant loses its water by osmosis via the root hairs. The cells of the root dry hence the plant becomes plasmolysed, this decreases the turgidity of and decreases the mechanical support.

When the soil osmotic pressure is low, water from the soil enters the root hair cells by osmosis causing the plant cell tissues to become turgid as the plant uses developing tension increasing mechanical support.

$\frac{1}{2}$ mark @ total 6 marks

Photosynthetic products are transported by mass flow, in the phloem; as a result of a pressure potential gradient, developing between the source (leaves) and sink (roots or areas of storage).

Photosynthesis results into accumulation of sugars in mesophyll cells which in form of sucrose are actively pumped into sieve tubes using energy from companion cells / transfer cells. This lowers the water potential so that water enters by osmosis from adjacent xylem vessels. As a result, the hydrostatic pressure increases.

At the sink, the solutes are utilized in respiration or stored and hence the solute potential decreases.

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- Concentration of ethene increases to speed up the process of fruit ripening

03

- Increased Abscisic Acid to enhance abscission and fruit fall

- Increased Vitamin C increasing the fruit's nutritional value.

any 3 03 mks

i. i. Abscission is the organised shedding of part of the plant like a leaf, unfertilized flower or a fruit. Any one correct example.

02

ii. At the base of the organ e.g. the fruit in the region called abscission zone there is increased Abscisic acid (ABA) which increases the activities of cellulase and pectate enzymes which increases the breakdown of cellulose and middle lamella respectively causing the layer of cells in this zone to separate and form abscission layer made up of waste cells such that a slight action of wind or touch causes the fruit to fall leaving a corky outer layer of periderm as a scar.

09 May 08

TOTAL 47 marks ... 11 -

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to zero while the carotene content increased rapidly because the ripening is nearly completed and the chlorophyll stores pigment are getting depleted while the fruit is getting uniform color and strong smell hence increased synthesis of carotenes. $\frac{7}{2}$ max 06

06

- (d) \Rightarrow Increase in the rate of respiration facilitates changes in tissue organisation and synthesis of ethene which facilitate fruit ripening and breakdown of chlorophyll
 \Rightarrow Increased sugar content is increased 05 the amount of sweetners and smell making the fruit palatable hence increasing the chances of its dispersal.
 \Rightarrow Decreased chlorophyll content increased fruit ripening and colourful appearance for its dispersal.
 \Rightarrow Increased carotenes gave the fruit an attractive colour for its dispersal.

- (e) - The cell wall becomes degraded to make the fruit wall soft for easy palatable and dispersal of seeds in case of abscission.

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From 4 to 6 days; the sugar content increased gradually because the process of ripening is getting completed and also the starch stores are almost depleted.

Q6

From 6 to 7 days; the sugar content remained almost constant because the starch stores are depleted and the process of fruit ripening is completed reducing the energy demands and respiration is at minimum.

(c) From 1 to 4.5 days; the chlorophyll content decreased rapidly while the carotene content increased gradually because of increase in ethene which increases the activation of enzymes chlorophyllase and respiration increasing the breakdown of chlorophyll. Also chloroplasts are converted to chromoplasts while the carotenes are being synthesised so that the fruit attains an attractive colour and smell which is important for its dispersal.

From 4.5 to 7 days; the chlorophyll content decreased gradually

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Increased the movement of sugars e.g. glucose and fructose from the cell vacuole to cytoplasm increasing the availability of respiratory substrates.

From 3.5 to 4.7 days; the respiration rate decreased rapidly because the process of fruit ripening is getting completed and chlorophyll is getting depleted.

From 4.7 to 7 days; the respiration rate decreased gradually because the chlorophyll content in the fruit is almost depleted reducing the activity of enzymes.

ii Sugar Content:

From 1 to 2.5 days; the sugar content increased gradually because there is formation of enzymes needed for fruit ripening, mobilisation of ripening hormones like ethene hence slow breakdown of starch to sugars.

From 2 to 4 days; the sugar content increased rapidly because most of the enzymes are mobilised and activated, presence of ethene hence increased breakdown of starch to sugars for increased respiration.

05

05

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SECTION A:

1

(a)

ii. Respiration rate.

From 1 to 3.5 days; the respiration rate increased rapidly to the peak ✓

From 3.5 to 4.7 days; the rate of respiration decreased rapidly ✓

From 4.7 to 7 days; the respiration rate decreased gradually ✓

ii. From 1 to 2.5 days; the sugar content increased gradually ✓

From 2.5 to 4 days; the sugar content increased rapidly ✓

From 4 to 6 days; the sugar content increased gradually ✓

From 6 to 7 days; the sugar content remained almost constant ✓

b) From 1 to 3.5 days; the respiratory rate increased rapidly due to the production of ethene which increased the metabolism. Increased respiration provided more energy for the breakdown of chlorophyll through the actions of enzyme chlorophyllase.

The rate of respiration increased because of increased permeability of tonoplast of cell vacuole, which

✓

MARKING GUIDE

P53012



Total mark scored	
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**READ THE INSTRUCTIONS BELOW
CAREFULLY BEFORE USING
THE ANSWER BOOKLET.**

1. Use a blue or black ink ball pen. Work in pencil, other than graphs, maps and drawings, will not be marked.
 2. List the question numbers, in the order attempted, in the left-hand column of the boxes opposite.
Do not list the multiple choice questions.
 3. Write your answers on both sides of each sheet.
 4. Do your rough work in this answer booklet. Cross through any work you do not want marked.
 5. Do not fold, dismantle or tear any part of the answer booklet. Do not accept an answer booklet with missing pages. Folding, dismantling or tearing of the answer booklet is malpractice and shall lead to cancellation of results. All work must be handed in.
 6. Check that you have written your name, signature, random number and personal number on each page of the answer booklet(s) used. Tie all the booklets used together.
 7. Do not share your work with another candidate or expose your work such that another candidate can copy from it. Sharing or exposing your work may lead to cancellation of results.
 8. Answer only the number of questions as instructed on the question paper. Answers to extra questions will not be marked.

Write here the number of
answer booklets you have used.