BIOLOGY

1. LIFE PROCESSES

NUTRITION

1. Living beings can be distinguished from non-living things due to their organised structure and life processes, like nutirion, respiration, transportation, excretion and reproduction.
2. Life processes are the processes that are necessary for an organism to do the maintenance job and to stay alive. Eg. Nutrition, respiration, transportation, excretion and reproduction.
3. Nutrition is the process in which an organism takes the food, utilizes it to get energy, for growth, repair and maintenance.
4. Autotrophic nutrition (Auto =self: trophos = nourishment)

   E.g. Plants, Algae, blue green bacteria.
5. Process of Photosynthesis (Photo=light; Synthesis= to combine).Raw materials- for the process are (i) Carbon dioxide (ii)Water
6. Factors for Autotrophic nutrition -

   (i) Carbon dioxide (ii) Water (iii) Light (iv) Temperature v)Chlorophyll
7. Steps of photosynthesis-

   (i) Absorption of light energy by chlorophyll

   (ii) Conversion of light energy to chemical energy & Splitting of water molecule into Hydrogen & oxygen

   (iii) Reduction of Carbon dioxide to Carbohydrate
8. Heterotrophic nutrition: (Hetero =others; trophos = nourishment)

   Organisms that depend on other organisms for food.
9. Nutrition in human beings

   Mouth - Oesophagus - Stomach - Small intestine- Large intestine

10. Food is completely digested in small intestine where Carbohydrates are converted into glucose, fats into fatty acids and glycerol and proteins into amino acids.

RESPIRATION

1. Respiration commonly involves the use of oxygen to break down carbohydrates and other organic molecules releasing energy, Carbon dioxide and water in the process.
2. Partial oxidation of food in the absence of oxygen, resulting in the release of some amount of energy is called 'anaerobic respiration'
3. The complete oxidation of food yielding carbon dioxide, water, and energy in the presence of oxygen is called aerobic respiration.
4. During day time in plants, Carbon dioxide which is given out during respiration is used for photosynthesis and only Oxygen is released.

5 During night time only respiration takes place. Therefore only Carbon dioxide is released, which is a major activity during the night.

6 Terrestrial animals take Oxygen from the atmosphere. Aquatic animals take Oxygen dissolved in water. Oxygen content is low in water, therefore they breathe faster.

7 In human respiratory system the path of air is

External nostrils -->Nasal cavity-->internal nostrils-->Phaynx-->Larynx-->

Trachea-->Bronchi-->Bronchioles-->Alveoli

8. Respiration occurs in two phases-

(i) External respiration - occurs in the lungs where oxygen diffuses into the blood and carbon dioxide diffuses into the alveolar air.

(ii) Internal respiration - occurs in the metabolizing tissues, where oxygen diffuses out of the blood and carbon dioxide diffuses out of the cells.

9. Exchange of gases in unicellular organisms like Amoeba takes place by Diffusion.
10. In animals as the body size is large, diffusion alone is not enough.

(ii) Respiratory pigment in human beings is Haemoglobin which helps in carrying the gases to the cells and out of the cells.

Transportation in human beings and Plants

1 Lymph- Extracellular fluid similar to plasma but colourless with lesser protein. Blood has Plasma, RBC, WBC, Platelets and is red in colour due to pigment called haemoglobin. It is a fluid connective tissue.

Plasma transports food, Oxygen, Carbon dioxide, Nitrogenous wastes, etc.

2. Functions of blood are Transport of respiratory gases ,hormones, nutrients, enzymes, waste products, Defence against infection and maintains body temperature.

3. Blood vessels-

(i) Arteries (Thick walled)-carry oxygenated blood to all parts (except pulmonary artery).

(ii) Veins (Thin walled) -Carry Deoxygenated blood(except pulmonary vein).

(iii) Capillaries.

4. Heart has four chambers- Two upper and two lower chambers called Atria and Ventricles.

5. Working of heart- Left side-

i) Oxygenated blood enters left auricle from the lungs through the pulmonary vein.

ii) The blood enters the left ventricle through the mitral(bicuspid) valve.

(iii) Left Ventricle contracts and the blood is pumped to all parts of body.

6. Working of heart-Right side-

i)The deoxygenated blood from the body enters right auricle through superior and inferior Vena cava.

ii) The blood enters the right Ventricle through the tricuspid valve.

iii) Right Ventricle contracts and the blood is pumped into lungs.

7. In Double circulation the blood passes through the heart twice in one complete cycle of the circulation. Seen in Amphibians, reptiles, Aves and Mammals

   Single circulation: Seen in fish wherein the blood reaches the heart only once.

8. Transport of water takes place by xylem tissue present in roots, stem, leaves. In very tall plants- transpiration creates a suction pressure, which pulls the water upwards.

9. Transpiration helps in upward movement of water in plants.It regulates the temperature in plants.

10. Transport of food is by phloem tissue and the process is called translocation.

Excretion

1. The removal of metabolic waste products from the body of an organism and to create ionic balance is known as 'excretion'.
2. The nephron is the structural and functional unit of a kidney. It consists of the Malpighian capsule, the proximal convoluted tubule, Henley's loop and the distal convoluted tubule.
3. The organs of the urinary system in humans are

   (i) Kidneys (iii) Urinary bladder (ii) Ureters (iv) Urethra
4. Kidneys are located in the abdomen,one on either side of the backbone.
5. Artificial kidney is called dialysis. Principle of Dialysis: Diffusion

   Process involved : Osmosis.
6. Gaseous wastes- CO_2 in respiration & O_2 in photosynthesis are removed by the process of diffusion.
7. Excess water is removed by transpiration.
8. Other wastes are stored in cellular vacuoles or in leaves, which fall off or stored as gums, resins, etc.

2. CONTROL AND COORDINATION

1. The working together of the various systems in the body in a proper manner to produce appropriate reaction to a stimulus is called co-ordination.

2. Chemical coordination is seen both in plants and animals.Neural coordination is seen only in animals.
3. Stimulus- The changes in the environment to which an organism responds and reacts is called Stimulus
4. Nervous system consists of Brain ,Spinal cord and Neurons
5. The path of nerve impulse is

   Stimulus -->Receptor organ --> Sensory nerve --> Brain/Spinal cord --> Motor nerve --> Effector organ --> Response
6. The response in Endocrine system is as follows

   Stimulus --> Endocrine organ --> Secrete hormone --> Hormone in blood --> Target organ -->Response
7. Transmission of nerve impulse :

   By Electric impulse (inside the neuron), Chemicals neurotransmitters (At synapse-Space/junction between two adjacent nerves).
8. Reflex action is spontaneous, involuntary and automatic response to a stimulus to protect us from harmful situations.

   Eg : On touching a hot object unknowingly we instantly withdraw our hand.
9. The pathway of the reflex action is called Reflex arc.It is as follows:

   Stimulus --> Receptor organ --> Sensory nerve --> Spinal cord --> Effector organ --> Response
10. Parts of brain-

    Fore Brain : (i) Cerebrum (ii) Thalamus (iii) Hypothalamus

    Mid brain:The midbrain serves important functions in motor movement, particularly movements of the eye, and in auditory and visual processing.

    Hind brain : (i) Cerebellum (ii) Pons Varolli (iii) Medulla oblongata
11. Cerebellum – Controls & coordinates muscular movements, maintaining body posture and equilibrium.

12. Medulla oblongata- Controls involuntary actions like blood pressure, salivation, vomiting, etc.

13. Protection of the brain & the spinal cord-

    (i) Bony outer covering: Cranium for the brain & vertebral column for the spinal cord Cylindrical or tubular structure extending downwards from the Medulla oblongata.

    (ii) Cerebrospinal fluid present in between the 3 membranes.

14. Path or action of nerve impulse

    Nerve impulse --> Muscle cell --> Changes shape due to special proteins --->Action caused --> Shorter form of muscles --> Change shape & arrangement of cell

15. Chemical communication by hormones- (advantages)

    The nerve cells cannot generate & transmit impulses continuously.

    Chemical transmission is slower but continuous and steady and potentially reach all the cells regardless of electrical connections..

16. Hormones are chemical messengers secreted by endocrine glands.

17. Tropic movements- The movements of plants in the direction of stimulus (positive) or away from it (negative) are called tropic movements. E.g. Phototropism, Geotropism. Chemotropism.(pollen moving towards ovule.) and hydrotropism(roots moving towards water)

18. Nastic movements -The movements of plants independent of stimuli are called nastic movements. E.g.- Touch me not plant leaves close when touched.

19. Plant responses and growth are controlled by chemical messengers called plant hormones.

    i) Auxins promote cell elongation, cell divisions, etc,

    ii) Gibberellins are growth hormones of plants which help in growth of the stem.

    iii) Cytokinins and abscisic acid inhibit growth

20. A feedback mechanism regulates the action of hormones.

3.HOW DO ORGANISMS REPRODUCE?

1. Reproduction is the process by which living beings create new organisms that very much look like themselves to continue their lineage.
2. The method of reproduction when a single parent is involved and no gamete formation takes place is called asexual reproduction. No meiosis happens during asexual reproduction.
3. The method of reproduction when two parents are involved and gamete formation takes is called sexual reproduction.
4. Binary Fission is an asexual process of reproduction seen in most of the unicellular animals where one parent simply splits equally into two daughter cells Eg : Amoeba
5. In multiple fission the organism develops a thick coating around itself(cyst) and divides into many daughter cells simultaneously.Eg Plasmodium.
6. Budding is an asexual type of reproduction where buds form and detach from the mother cell or organism and develop into an individual organism.Eg Yeast,hydra.
7. Reproduction by fragmentation is seen in filamentous algae, e.g. spirogyra. The mature filament of spirogyra divides into many pieces and each piece develops into a new individual.
8. Regeneration is a type of asexual reproduction where some simple organisms can regenerate a new individual from a part which has been accidentally cut off. Eg: planaria
9. Most of the fungi, bryophytes and pteridophytes reproduce by spore formation method. Spores are produced in special spore-bearing organs called sporangium. When spores mature; the sporangium bursts open to release them.
10. Vegetative propagation is a special case, as it happens in higher plants; When a vegetative part of a flowering plant reproduces a new plant, it is called vegetative propagation. Some examples of vegetative propagation are given below.

Eg : potato -modified stem. 'eyes'

Carrot and sweet potato -modifications of roots; ginger and garlic-modified underground stems- Rhizomes. Bryophyllum-Leaves marginal notches.

Stem cutting, layering and grafting are the preferred means of artificial vegetative propagation

11. Flower is a modified leaf which bears special organs and plays the role of the reproductive system in plant.

12. A typical flower is composed of four distinct whorls, viz. Calyx, Corolla, Androecium and Gynoecium.

13. A flower with both Androecium and Gynoecium is called bisexual eg: Hibiscus, and a flower with either androecium or gynoecium is called unisexual flower. Eg: Papaya, Watermelon.

14. The transfer of pollen grains from anther to the stigma of a flower is called pollination.

    a) If the pollen grains of a flower are transferred to the stigma of the same flower; it is called self pollination.

    b) If pollen grains of a flower are transferred to the stigma of a different flower of the same species is called cross-pollination. Pollinating agents e.g. insects, animals, air, water, etc. Insects.

15. The fusion of male and female gametes is called fertilization. The product of fertilization is called zygote.

16. The embryo (seed) has two pointed parts. The upper part is called plumule which gives rise to the shoot system. The lower part is called radicle which gives rise to the root system.

17. The male reproductive system in human beings is composed of pair of testes, Vas deferens ,seminal vesicle, Epididymis, prostate gland, Urethra, penis.

    'The female reproductive system in human beings is composed of Uterus, fallopian tube, ovaries, vagina(birth canal)

18. Human beings mark the onset and attainment of sexual maturity. This period is called puberty. This occurs at around 10 – 11 years of age in girls and at around 12 – 13 years of age in boys.

19. The physical dissimilarities in the male and female of a species which give them different appearances is called sexual dimorphism.

20. When the egg is not fertilized, it gets disintegrated and so does the additional lining in the uterine wall. The fragments of disintegrated tissues are shed; along with blood.

21. The whole sequence of events during an ovulation cycle is called menstrual cycle..

22. The first menstrual flow is called menarche and the last menstrual flow (which happens in the late 40s) is called menopause.

23. Unprotected intercourse has the potential of creating many sexually transmitted diseases. Examples of STDs are; gonorrhea, syphilis are caused by bacteria. Herpes, AIDS, Hepatitis B are caused by virus.. AIDS and Hepatitis B are incurable till date.