

O-Level

Section 1: Biology

Topic-1; cells

- Variety of cells
- Structure and function of different organelles
- Prokaryotic and eukaryotic cell differences
- Energy related organelles (chloroplast and mitochondria)
- Movement of substances into and out of cells (diffusion, active transport and osmosis)
- Cell division (mitosis and meiosis) and cell cycle

Topic 2: Plants:

- Photosynthesis (light reaction and dark reaction)
- Transpiration and gas exchange
- Leaf: structure, function and stomata
- Structure of flowers.
- Transport of water, minerals and assimilates; Structure of root (endodermis) and stem (vascular bundles)
- Growth and development: Growth hormones, development of apical meristem and cambium, germination.
- Reproduction : asexual reproduction (clone forming), sexual reproduction, pollination, double fertilization.

Topic 3: Genetics and evolution

- Structure and location of gene and chromosome
- Understand that genes exist in alternative forms called alleles which give rise to differences in inherited characteristics
- Recall the meaning of the terms dominant, recessive, homozygous, heterozygous,
- Phenotype, genotype and co-dominance
- Mendelian patterns of inheritance
- Describe patterns of monohybrid and inheritance using a genetic diagram
- Understand that the sex of a person is controlled by one pair of chromosome, XX in a female and XY in a male
- Describe the determination of the sex of offspring at fertilization, using a genetic diagram
- Understand that variation within species can be genetic, environmental or a combination of both
- Human Genome project

Topic 4: Diet and Nutrition

- Understand that a balanced diet should include carbohydrate, protein, lipid, vitamins, minerals, water and dietary fiber
- Recall sources and describe functions of vitamins
- Importance of mineral ions- calcium , zinc, iron
- Nutrition during pregnancy and lactation
- Nutrition during infancy
- Food safety: Laws, Regulations and Issues
- Phytotherapy; commonly used botanicals-garlic, ginger, cinnamon
- Medical nutrition therapy for Diabetes Mellitus

- Roles of fish oil in lowering serum cholesterol level
- Importance of green and leafy vegetables

Topic 5: Ecology and the environment

a) Ecosystems: the flow of energy

- Ecology and ecosystem
- Ecosystem of ocean, fresh water and forest
- What is food chain, food webs, pyramids of biomass and pyramids of energy transfer

b) Cycles within ecosystems

- Describe the stages in the water cycle, including evaporation, transpiration, condensation and precipitation
- Describe the stages in the carbon cycle, including respiration, photosynthesis, decomposition and combustion
- Describe the stages in the nitrogen cycle, including the roles of nitrogen fixing bacteria, decomposers, nitrifying bacteria and denitrifying bacteria (specific names of bacteria are not required).

c) Human influences on the environment

- Environmental pollution; Air pollution, water pollution eutrophication and , soil pollution and sound pollution of Dhaka city
- Greenhouse gases and their effect on environment
- Global warming and its consequences
- The biological consequences of overfishing and overgrazing.
- Role of fertilizer, pesticides and friendly insects

- Arsenic toxicity and its impact on human life
 - Led pollution
 - Climate change and its impact on global agriculture/ economic and social implications (floods, droughts, cyclones, wind, storms and dust storms , deforestation, El Nino and La Nina)
- e) Conservation of wild life

Topic 6: Use of biological resources

a) Food production

Crop plants

- Describe how glasshouses and polythene tunnels can be used to increase the yield of certain crops
- Understand the effects on crop yield of increased carbon dioxide and increased temperature in glasshouses
- Understand the use of fertilizer to increase crop yield
- Understand the reasons for pest control and the advantages and disadvantages of using pesticides and biological control with crop plants.

Micro-organisms

- Understand the role of yeast in the production of beer
- Describe a simple experiment to investigate carbon dioxide production by yeast, in different conditions
- Understand the role of bacteria (*Lactobacillus*, *e. coli*) in the production of yoghurt

Topic-7; characteristics of living organisms

Human

- General overview to understand the function of lung, heart, liver and kidney
- Digestive system (summary of protein, carbohydrate and lipid digestion and related digestive enzymes)
- Glucose metabolism (aerobic and anaerobic glycolysis, role of insulin and glucagon in glucose metabolism)
- Breathing and respiratory system (what is breathing and respiration, aerobic and anaerobic respiration, gas exchange)
- Blood and circulatory system (composition of blood and their function, name of blood proteins, human circulatory system, structure and role of heart in blood circulation); lymphatic system-tissue fluid and lymph
- Sense organs and nervous system (name of different senses and sense organs, different nerve cells and their function, neurotransmitters and their mechanism of action)
- Immunity, antigens, antibody.

Topic 8: Human health

a) Disorders and conditions of the human body

- Understand that there are disorders of the human body caused by a variety of factors, including environmental, dietary and lifestyle
- Malnutrition
- Diet and cancer (e.g-smoky food, artificial food color, food preservatives)
- Effect of tea and coffee on health
- Effect of chocolate and Chinese food on health

- Consequence of smoking and alcohol consumption
- Impact of drugs, like- Yaba, heroin, fensidil, hashish on life
- Understand how excess energy intake in the diet (particularly from carbohydrates and lipids) can lead to obesity
- Understand the harmful effects of obesity on the heart and circulatory system

Topic 9: Classification

Classification and example of five kingdoms: Moneras, Protists, Fungi, Plants, Animals, characteristics of the ten phylum of the animal kingdom

Topic 10: Economic Importance of living beings

Names and details of Bangladeshi crops, name and details of trees producing clothing material, medicine, drinks, furniture; apiculture, sericulture, fish farming and prawn culture, development of animals with desired characteristics