FEDERAL BOARD OF INTERMEDIATE AND SECONDARY EDUCATION
H-8/4, ISLAMABAD

NO.0-27/FBISE/RESH/CC/BIO/SSC/1032 03 December 2010

NOTIFICATION

It is notified for information of all concerned that revised curriculum 2006 in the subject of Biology at SSC level shall stand implemented w.e.f. the academic session 2011-2013. Accordingly, the students to be admitted in class-IX in April 2011 and subsequently promoted to class-X in April 2012 shall be examined in accordance with the revised curriculum in SSC Part-I and Part-II examinations to be held in the years 2012 and 2013 respectively. Contents of syllabus of class IX are enclosed herewith.

2. The book developed by the Punjab Textbook Board and published by PLD Publishers, Lahore may be consulted for reference and supplementary material.

3. There is no change in the format of question paper presently in vogue.

4. However, the students currently studying in class-IX shall continue to study the old syllabus undisturbed and shall be examined accordingly in SSC Part-I examination 2011 and SSC Part-II examination 2012.

5. A copy of the curriculum 2006 in the subject of Biology for class IX is being hoisted shortly on the FBISE's website www.fbise.edu.pk for the benefit of all stakeholders.

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All heads of institutions affiliated
with FBISE at SSC level

Copy to:

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2. Director General, Federal Directorate of Education, G-9/4, Islamabad
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4. Director Education, (Schools/Colleges) PAF Rear Air HQs Peshawar Cantt.
5. Director Education, Directorate of Naval Educational Services, Naval HQ. Islamabad
6. Director Education, Army Education Directorate, (IGT & E Branch), GHQ, Rawalpindi
7. General Manager (Education), Fauji Foundation Head Office, Welfare Division, Chaklala, Rawalpindi
8. Director Education, OPF Head Office, F-5, Islamabad
9. Members BOG, FBISE, Islamabad
10. All Chairmen, BISEs
11. Chairman, Punjab Textbook Board, Lahore
12. Secretary, Inter Board Committee of Chairmen, Islamabad
13. Secretary, Punjab Textbook Board, Gulberg, Lahore
14. All GSO-I
15. All Embassies
16. Director OWC, FBISE
17. Incharge, FBISE Sub-Office, Gilgit.
18. All Sectional Heads of FBISE, Islamabad

BIOLOGY

For Class IX

- 7.2.3 Limiting Factors in Photosynthesis
- 7.2.4 Adaptations in Leaf Structure for Photosynthesis

7.3 Respiration
- 7.3.1 Aerobic Respiration, Anaerobic Respiration
- 7.3.2 Mechanism of Respiration (Glycolysis, Krebs Cycle, Electron Transport Chain)

8. NUTRITION

8.1 Introduction

8.2 Nutrition in Plants
- 8.2.1 Nutrition and Nutrients (Plant Nutrients and Modes of Nutrition)
- 8.2.2 Mineral Nutrition in Plants (Role of Nitrates and Magnesium and effects of their deficiencies)

8.3 Nutrition in Man
- 8.3.1 Major Components of Food (Carbohydrates, Proteins and Fats)
- 8.3.2 Effects of Vitamins (A, C and E) in terms of their; sources, metabolic functions and deficiencies
- 8.3.3 Effects of Minerals (Calcium and Iron) in terms of their; sources, metabolic functions and deficiencies
- 8.3.4 Effects of Water and Dietary fibers in terms of their; sources and metabolic functions
- 8.3.5 Balanced Diet (Concept, Diet related to age, sex and activity)
- 8.3.6 Problems related to Nutrition
  - 8.3.6.1 Protein Energy Malnutrition
  - 8.3.6.2 Mineral Deficiency Diseases (Scurvy, Rickets, Night blindness)
  - 8.3.6.3 Famine (Unequal distribution, Drought, Flooding, Increasing population)

8.4 Digestion in Man
- 8.4.1 Ingestion, Digestion, Absorption, Assimilation and Egestion
- 8.4.2 Identification and Functions of the main regions of human Alimentary Canal
- 8.4.3 Role of liver in digestion, glucose and amino acid metabolism and formation of urea
- 8.4.4 Absorption of Food (Structure of Villus, Role of capillaries and lacteals)

8.5 Disorders of Gut (Diarrhea, Constipation, Appendicitis, Threadworm diseases)

9. TRANSPORT

9.1 Introduction

9.2 Transport in Plants
- 9.2.1 Water and ion uptake (Structure and function of root hairs)
- 9.2.2 Transpiration
  - 9.2.2.1 Introduction and Significance
  - 9.2.2.2 Factors affecting the rate of Transpiration
- 9.2.3 Transportation of Food and Water
  - 9.2.3.1 Pathway of water and food in stem
  - 9.2.3.2 Structure and function of Xylem and Phloem

9.3 Transport in Man
- 9.3.1 Blood
  - 9.3.1.1 Components of Blood and their Functions
  - 9.3.1.2 Blood Groups and Blood Transfusion
  - 9.3.1.3 Disorders of Blood (Leukemia and Thalassemia)
- 9.3.2 Human Heart
  - 9.3.2.1 Structure of Heart
  - 9.3.2.2 Functioning of Heart (Circulation through heart, Heartbeat, Heart rate)
- 9.3.3 Blood Vessels
- 9.3.4 General Plan of Human Blood Circulatory System
- 9.3.5 Cardiovascular Disorders (Atherosclerosis, Arteriosclerosis, Myocardial Infarction)

LIST OF PRACTICALS
For Class-IX

1. **Introduction to Biology**
   1. Study of different types of bacteria with the help of prepared slides and of *Amoeba, Paramecium, Volvox* from prepared slides/ fresh culture/charts
   2. Study of external morphology of mustard plant and microscopic examination of root, stem, leaf, flower, fruit and seeds
   3. Identification of major organs and organ systems in a dissected frog (Dissection by demonstrator/teacher)
2. **Solving an Biological Problem**

   No Practical Activity
3. **Biodiversity**
   4. Observation of the apparent distinguishing taxonomic characters from fresh and preserved specimens and recognition of plants and animals on the basis of their taxonomic characters
   5. Evaluation of graphs of a population of an insect, which is endangered (due to excessive use of insecticides) and interpret the reasons for its endangered status
4. **Cells and Tissues**
   6. Use of microscope to observe movement of water in plants and to compare sizes of various types of cells
   7. Examination under the microscope an animal cell (e.g. from frog's blood) and a plant cell (e.g. from onion epidermis), using an appropriate temporary staining technique, such as iodine or methylene blue
   8. Identify, from fresh preparations, the cell membrane, nucleus and cytoplasm in an animal cell and the cell wall, cell membrane, sap vacuole, cytoplasm, nucleus and chloroplasts in a plant cell
   9. Preparation of the wet mounts of tissue from flowering plants and study of plant and animal tissues from charts and prepared slides
   10. Determination of the effect of tonicity on plasmolysis and deplasmolysis in plant cells or in Red Blood Cell
   11. Data collection on the number of stomata per unit area on various plant leaves that grow in areas of differing humidity, and compilation of data in a spreadsheet and graph it to determine whether there is a relationship between the variables
5. **Cell Cycle**
   12. Observation of various stages of mitosis and meiosis by slides, model and charts
   13. Preparations of root tip squashes and study stages of mitosis
6. **Enzymes**
   14. Experiment to show working of enzyme in vitro e.g., pepsin working on meat in test tube 76 National Curriculum for Biology IX-X
   15. Experiment to test enzyme action by putting diastase in a starch solution in test tube at 37°C and after fifteen minutes performing iodine test for presence of starch
7. **Bioenergetics**
   16. Demonstration of the process of photosynthesis using an aquatic plant, like *Hydrilla*
   17. Identification and labeling of the cellular and tissue structure in the CS of a leaf through observation under the microscope
   18. Investigation of the necessity of chlorophyll, light, carbon dioxide, using appropriate controls
   19. Experiment to demonstrate the process of respiration in germinating seeds by using limewater
   20. Investigation of the release of carbon dioxide and heat during Aerobic Respiration in germinating seeds
8. **Nutrition**
   21. Food tests: Benedict's test for reducing sugar, iodine test for starch, spot test and emulsion test for fat, and Biuret test for protein in solution
   22. Microscopic examination of a transverse section of the small intestine to show the villi
9. **Transport**
   23. Measurement of differences in length/weight of raw potato strips in concentrated salt solution and water
   24. Observation of root hairs on a growing root of onion, carrot etc

25. Microscopic observation of the structure and number of stomata in an epidermal peel of a leaf
26. Investigation of the rate of water loss at the two surfaces of a leaf by a simple experiment using cobalt chloride paper
27. Investigation of transpiration in potted plant under a bell jar
28. Identification of xylem and phloem tissues in the prepared slides of stem, root and leaf
29. Investigation of the pathway of water in a cut stem, using a suitable stain
30. Identification of red and white blood cells under the light microscope on prepared slides and in diagrams and photomicrographs
31. Investigation of the effect of physical activity on pulse rate
32. Experiment to show the capillary flow in a fishtail or fin or frog's web

REQUIRED APPARATUSES

S. No.	APPARATUSES	Qty
01.	Aquarium	01
02.	Aquarium net	01
03.	Balance	10
04.	Beaker (50ml, 100ml, 250ml, 500ml, 1000 ml)	10 Each
05.	Bell jar	20
06.	Blades (Safety razor)	20
07.	Burner (Bunsen)	10
08.	Burner (Spirit Lamp)	20
09.	Conical Flask	20
10.	Cotton Wool	04
11.	Differential air Thermometer	10
12.	Dissecting Board	20
13.	Dissecting Box	20
14.	Dissecting Tray	20
15.	Dropper	20
16.	Funnel 4" and 6" dm	20 Each
17.	Glass Tube	04 Packets
18.	Incubator	01
19.	Inoculation Loop	06
20.	Insect Net	12
21.	Lens Paper	06
22.	Light Source	10
23.	Magnifying Glass	10
24.	Measuring Cylinder	10
25.	Microscope (Compound: 10X eye piece, 4X, 10X and 40X objectives)	20
26.	Microscope (Dissecting)	20
27.	Microscope Cover Slip	04 Packets
28.	Microscope Slide	04 Packets
29.	Petri Dish	20
30.	Pipette (10 ml)	10
31.	Plant Presser	04
32.	Plate (Glass)	06
33.	Potometer	04
34.	Preserved Specimens of representative animals	01 Each
35.	Reagent Bottles	20
36.	Specimen Jars	10
37.	Stop Watch	05
38.	Stopper (Cork)	20
39.	Syringe	10
40.	Test Tube Rack	08
41.	Thermometer	20
42.	Thermos Flask	20
43.	Tripod Stand	10
44.	Watch Glass	20

REQUIRED SLIDES

S. No.	SLIDES	Qty
01.	Bacteria	02
02.	Cells of onion epidermis and *Hydrilla* Leaf	02
03.	Conjugation in *Paramecium*	02
04.	Mitosis and Meiosis in Onion root tip	02
05.	Nerve Cell	02
06.	Rhizopus and Mushroom	02
07.	Section of Mammalian kidney	02
08.	Sections of animal tissues	02
09.	Transverse Section of Artery, Vein and Capillary	02
10.	Transverse Section of Human Small Intestine	02
11.	Transverse Section of Leaf, Root and Stem of *Brassica*	02
12.	Transverse Section of Mammalian Air sacs	02
13.	Transverse Section of Woody stem	02

REQUIRED CHEMICALS

S. No.	CHEMICALS	Qty
01.	Acetic acid	2.5 Liter
02.	Alcohol	2.5 Liter
03.	Ascorbic acid	2.5 Liter
04.	Benedict's solution	2.5 Liter
05.	Bromothymol blue solution	2.5 Liter
06.	Chloroform	2.5 Liter
07.	Copper sulfate solution	2.5 Liter
08.	Diastase	2.5 Liter
09.	Distilled water	2.5 Liter
10.	Eosine	2.5 Liter
11.	Ethanol	2.5 Liter
12.	Formaline	2.5 Liter
13.	Glucose solution 01%	2.5 Liter
14.	Glycerine	2.5 Liter
15.	Hydrogen carbonate indicator	2.5 Liter
16.	Iodine solution 01%	2.5 Liter
17.	Lime water	2.5 Liter
18.	Methylene Potassium hydroxide blue 01%	2.5 Liter
19.	Starch	2.5 Liter
20.	Sudan III solution	2.5 Liter
21.	Trypsin	2.5 Liter
22.	Wax	2.5 Liter

REQUIRED CHARTS

S. No.	CHARTS	Qty
01.	Animal and Plant Cell	01
02.	Biodiversity	01
03.	Biogeochemical Cycles	01
04.	Cell Division	01
05.	Germination	01
06.	Human Body Systems	01
07.	Mandelian Genetics	01
08.	Mechanism of Enzyme Action	01
09.	Plant Propagation	01
10.	Reflex Arc	01
11.	Sexual Reproduction in Plants	01

12.	Structure of DNA	01
13.	Transport of Material in Plants	01

REQUIRED MODELS

S. No.	MODELS	Qty
01.	DNA	01
02.	Human Brain	01
03.	Human Diaphragm and Intercostal Muscles	01
04.	Human Ear	01
05.	Human Eye	01
06.	Human Kidney	01
07.	Human Skeleton	01
08.	Neuron	01
09.	Pitcher Plant	01
10.	Sundew Plant	01