ISC Class 12 Biology Practical Syllabus for 2023

PAPER II

PRACTICAL WORK – 15 Marks

1) **Taxonomy**: Study floral characteristics through dissection of flowers, drawing floral formula and diagrams of following families:

   (i) Malvaceae: type – China rose / Hollyhock.

   (ii) Leguminosae: subfamily – Papilionaceae –type – Sweet pea/ Pea/ Bean/ *Sesbania*/*Clitoria* (single flower).

   (iii) Solanaceae: type – *Petunia* / *Datura* / Brinjal Flower / *Solanum nigrum*.

   (iv) Liliaceae: type – Onion or Amaryllidaceae –type – Lily/Spider lily/ Tiger lily/ Tube rose/*Gladiolus*.

   Floral characteristics should be explained by dissection of flowers. Students should be taught how to cut vertical section of the flower and draw accurately labelled diagrams. The technique of drawing floral diagrams with the ***mother axis in the right position is necessary.*** *Floral formula should be correctly written. Identification of the correct family giving reasons, technique of cutting T.S. and L.S of ovary should be explained and accordingly correct labelled-diagram should be drawn. Students should know the examples of plants (belonging to each family) which are of economic importance. The examples of common names of plants must be supported with correct scientific names as well.*

   NOTE: In the examination, candidates will be tested on <u>any one</u> of the above families.

2) Simple biochemical and physiological experiments

(i) Study of arrangement/distribution of stomata in dicot and monocot leaves.

Students should be taught to set up and demonstrate the experiments with correct diagram of the setup, record their observations methodically and give conclusions. This will give a clear idea of the physiological processes. Questions can be asked based on the above physiological processes studied.

(ii) To study the effect of enzyme action at three different temperatures and pH on starch solution.

Effect of enzyme (amylase/ diastase) action at three different temperatures (low- below 10°C, optimum - 37°C and high – above 70°C) and pH (acidic, neutral and basic) on starch solution.

(iii) To isolate DNA from available plant material.

Isolation of DNA from spinach leaves, green pea seeds, pulp of banana and papaya.

Take half a ripe and peeled banana into a beaker and add 50 ml of extraction fluid (1.5gm table salt +10 ml liquid detergent +90 ml distilled water). Place the beaker in a water bath set at 60 °C for 15 minutes. Stir gently with a glass rod. Filter 5ml of cooled content into a clean test tube and add 5ml of cold 90% ethanol. DNA molecules separate out and appear as white fibres.

3) Slide preparation

(i) Germination of pollen grain in a nutrient medium.

(ii) T.S. of ovary of any locally available flower, to show marginal / axile placentation.

(iii) T.S. of a hydrophyte stem.

(iv) T.S. of a xerophytic leaf (*Nerium).*

(v) L.S. of monocot and dicot seed (soaked seeds of maize/wheat, pea/ bean.)

The technique of staining and mounting neatly should be explained. Students should also know how to make labelled outline diagrams. They should also be taught to identify the mount under low/ high power of microscope. ***Two*** *identifying features of the above need to be mentioned.*

4) Spotting: (three minutes to be given for each spot which includes identification, drawing a labelled diagram and writing at least two identifying characteristics).

NOTE: <u>Spotting must be done on a separate answer sheet during examination, which should be handed over to the Examiner immediately after spotting</u>.

(i) Identify and comment on the following:

(a) T.S. of ovary of mammal (Permanent slide).

(b) T.S. of testis of mammal (Permanent slide).

(c) Germinating pollen grain (slide/chart).

(d) T.S. of ovary to show the type of placentation (marginal, axile, basal (LS), parietal).

(e) T.S. of blastula / blastocyst of a mammal (chart/ slide).

(f) Whole mount of *Plasmodium* sporozoite (slide /chart).

(g) Whole mount of *Entamoeba histolytica* trophozoite (slide/chart).

(h) Preserved specimen/ chart/ model of *Ascaris.*

(ii) Comment upon ecological adaptations of plants and animals.

Models/ virtual images/ charts of one plant and one animal found in xeric and aquatic habitats. Examples: Hydrilla, cactus, fish and camel.

PROJECT WORK AND PRACTICAL FILE – 15 Marks

Project Work – 10 Marks

The project work is to be assessed by a Visiting Examiner appointed locally and approved by the Council.

The candidate is to creatively execute **one** project/assignment on an aspect of biology. Preference is to be given to investigatory projects. Teachers may assign or students may choose any **one** project of their choice. Students can choose any other project besides the ones indicated in the list.

Following is **only a suggestive** list of topics:

(i) Genetic disorders
(ii) Gene therapy
(iii) Human Genome Project
(iv) DNA fingerprinting
(v) Bio-piracy
(vi) Cancer.
(vii) AIDS/Hepatitis.
(viii) Drug addiction and community.
(ix) Role of micro-organisms in industry.
(x) Human population.
(xi) Mendelian Inheritance
(xii) Environmental resistance.
(xiii) Traditional and modern methods: Study of a few traditional methods of pest deterrence vis-a-vis modern methods of pest control - viability of traditional methods in today's scenario and limitations and dangers of modern methods.
(xiv) Role of agrochemicals in increasing food production.

Suggested Evaluation Criteria for Project Work:

Format of the Project:

– Content
– Introduction
– Presentation (graphs, tables, charts, newspaper cuttings, diagrams, photographs, statistical analysis if relevant)
– Conclusion/ Summary
– Bibliography

Practical File – 5 Marks

The Visiting Examiner is required to assess students on the basis of the Biology Practical file maintained by them during the academic year.

Each practical done during the year, needs to be recorded by the student in the Practical file and the same must be checked, signed and dated by the teacher.

SCIENTISTS AND THEIR CONTRIBUTIONS:

1. Oparin: Coacervates, Conditions on primitive earth were favourable for chemical evolution
2. Stanley Miller & Harold Urey: Recreated probable conditions on primitive earth
3. Ernst Haeckel: Proposed the recapitulation theory
4. Charles Darwin: Natural Selection
5. Hugo de Vries: Mutation
6. T. R. Malthus: Theory of Human Population Growth/ Essays on population
7. Alec Jeffrey: DNA finger printing
8. Temin and Baltimore: Reverse transcription.
9. Jacob, Monad and Lwoff: proposed Lac operon.
10. Watson and Crick: Structure of DNA
11. Nirenberg and Khorana: Genetic code
12. Benzer: Cistron, recon, muton
13. Gregor Mendel: Father of genetics
14. Sutton and Boveri: Chromosomal theory of inheritance
15. Hugo de Vries, Correns and Tschermack: Rediscovered Mendelism
16. T H Morgan: Linkage
17. P Maheshwari: Plant tissue culture
18. Henking: Discovered X-chromosome
19. F. Meischer: Isolated nucleic acid from pus cells, called Nuclein
20. Chargaff: Rule of equivalence in DNA structure
21. F. Griffith: Transformation in bacteria
22. Avery, MacLeod and McCarty: DNA is the genetic material
23. Hershey and Chase: DNA is the genetic material
24. Meselson and Stahl: Semi-conservative replication of DNA
25. G. Gamow: Triplet nature of codons
26. S Ochoa: discovered polynucleotide phosphorylase
27. Wallace: divided the Earth into biogeographical regions
28. M S Swaminathan: Green revolution in India
29. H Boyer: discovered Restriction Enzyme
30. S Cohen: method to transfer plasmid DNA in host cells
31. R. Mishra: Father of Indian Ecology
32. E. Wilson: coined the term Biodiversity
33. P Ehrlich: Rivet Popper Hypothesis
34. Sanger: DNA/Protein sequencing

LIST OF ABBREVIATIONS TO BE STUDIED

1. ADA- Adenosine Deaminase
2. CMI- Cell Mediated Immunity
3. CNG- Compressed Natural Gas
4. DFC- Detritus Food Chain
5. EFB- European Federation of Biotechnology
6. EST- Expressed Sequence Tags
7. ET- Embryo Transfer
8. GFC- Grazing Food Chain
9. GMO- Genetically Modified Organism
10. GPP- Gross Primary Productivity
11. hnRNA - Heterogeneous Nuclear Ribo Nucleic Acid
12. IARI- Indian Agricultural Research Institute
13. IMR- Infant Mortality Rate
14. ICSI - Intra Cytoplasmic Sperm Injection
15. IUCD/IUD – Intra uterine contraceptive device
16. IUCN- International Union for Conservation of Nature and Natural Resources
17. IUI- Intra Uterine Insemination
18. IUT- Intra Uterine Transfer
19. LAB- Lactic Acid Bacteria
20. MALT- Mucosal Associated Lymphoid Tissue
21. MMR- Maternal Mortality Rate
22. MOET- Multiple Ovulation Embryo Transfer Technology
23. NACO- National AIDS Control Organisation
24. NPP- Net Primary Productivity
25. PID- Pelvic Inflammatory Diseases
26. PKU- Phenyl ketonuria
27. RCH- Reproductive and Child Health Care Programmes
28. SCID – Severe Combined Immuno Deficiency
29. SNPs - Single Nucleotide Polymorphisms
30. snRNA- Small Nuclear Ribo Nucleic Acid
31. sRNA - Soluble Ribo Nucleic Acid
32. SSBP – Single Strand Binding Protein
33. UTR - Untranslated Region
34. VNTRs - Variable Number of Tandem Repeats