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Revised Multicolour Edition Based on CCE Pattern
As per NCERT/CBSE Syllabus

Science for Ninth Class
Part - 3

Biology

Containing
answers to NCERT
book questions and
value-based
questions

DR. P.S. VERMA
DR. V.K. AGARWAL



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This book has been revised according to the CCE pattern of school education based on NCERT syllabus prescribed by the Central Board of Secondary Education (CBSE) for Class IX

Science for Ninth Class (PART-3)

BIOLOGY



**As per NCERT/CBSE Syllabus
(Based on CCE Pattern of School Education)**

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**VALUE BASED
QUESTIONS
(WITH ANSWERS)**

This Book Belongs to:

Name.....

Roll No.....

Class..... Section.....

School.....





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PREFACE TO THE REVISED EDITION

We Indians are witnessing a challenging phase of renovation and implementation of revolutionary new ideas in the development and betterment of our nation. Our National Policy makers are becoming increasingly global in their attitudes, so there is a whiff of freshness in every walk of life be it Information Technology, Finance, Education, Health, Sports, Biotechnology or Agriculture. It appears as though we have awakened from a deep slumber, have recognised our worth and confidently taking forward steps towards progress and development of the India. Modern India is marching ahead with new hopes for the masses and downtrodden. Indeed science has become a channel to provide food, fabric, medicines, bioenergy, healthy environs and new lease of life to wild biota and protecting abiotic resources of the biosphere. Manoj Prasad recently reported in the Indian Express (December 3, 2010) on how a septagenarian tribal Mr. Simon Oranon saved rainwater and jungles with three dams, five ponds for year-round irrigation of crop fields and planted about 30,000 trees of sal, jackfruit, jamun and mango (to check the soil erosion). His ingenious social work has changed the lives of people in six villages of Chottanagpur (Ranchi), Jharkhand State (*i.e.*, Bero, Hariharpur, Jamtoli, Kaxitoli, Baitoli and Bhasanda villages). The present revised and enlarged multicolour edition of our book “**Science for Ninth Class (Part - 3) Biology**” is based on the latest CCE guidelines. The text part of the book is strictly according to the N.C.E.R.T Textbook. Present revised pruned edition of the book includes the following new features :

1. Text is thoroughly checked, corrected, revised and made tailor-made according to specific needs of our students.
2. The **Formative Assessment** of each chapter is updated according to needs of our readers. In chapter 5, adequate new ideas for activities, topics for seminars and modus operandi of holding a group discussion, all have been suggested.
3. A variety of questions, MCQs, etc., of **Summative Assessment** have been formulated to cover each chapter more exhaustively.
4. Almost 60 per cent questions of the book have been answered.
5. Chapter 4 of the book, is a bit bloated in volume since it carries entirely renewed Question Bank of practical related questions.

An attempt has also been made to include questions from the sample papers issued by CBSE Board.

Value Based Questions have been added at the end of each chapter. These questions are based on the application of Biology in our daily life. Value based questions are meant for inculcating social values amongst our young students.

Despite of all the major changes introduced in the present edition, we have maintained simplicity and modernity of the text so as to cater to all types of students including brilliant and outstanding ones.

Thanks and blessings to Ms Anubha Agarwal for painstaking editing and critical review of this book.

Our sincere thanks are extended to the management, editorial and DTP team of S. Chand & Company Ltd. Their tireless efforts remained quite crucial in timely release of this book.

Hope, our this endeavour will help IX class students of India and fire their imagination to learn more and more about the nature.

We welcome constructive criticism and healthy suggestions from our readers for the betterment of the book.

Meerut (U.P.)

AUTHORS

DISCLAIMER

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CONTINUOUS AND COMPREHENSIVE EVALUATION (CCE) SCHEME

For Term-I & Term -II

April to March

PROPOSED EVALUATION SCHEME FOR VARIOUS SUBJECTS

- The units specified for each term shall be assessed through both Formative and Summative Assessment.
- The students will be assessed by CCE in the school itself.
- CCE over one academic year will have two terms. (April-September and October-March).
- Each term will have two **formative** and one **summative** assessment.

There will be two **formative tests** and a term end **summative test**. The weightages and time schedule will be as under:

SEMESTER-I/TERM-I

Type of Test	Weightage	Time schedule	
Formative Assessment 1	10%	April to May	FA ₁ + FA ₂ = 20%
Formative Assessment 2	10%	July to Aug.	
Summative Assessment 1	30%	Sept.	SA ₁ = 30%

SEMESTER - II/TERM-II

Type of Test	Weightage	Time schedule	
Formative Assessment 3	10%	Oct. to Nov.	FA ₃ + FA ₄ = 20%
Formative Assessment 4	10%	Jan. to Feb.	
Summative Assessment 2	30%	March	SA ₂ = 30%

Design of the Question Paper for Summative Assessment

S.No.	Type of questions	No. of questions	Marks allotted to each question	Total Marks
1.	Very Short Answer Type (VSA)	03	01	03
2.	Short Answer Type - I (SA I)	04	02	08
3.	Short Answer Type - II (SA II)	12	03	36
4.	Long Answer Type (LA)	05	05	25
5.	MCQ (Practical Skills)	18	01	18
Total		42		90

FORMATIVE ASSESSMENT IN SCIENCE INCLUDES :

A. Assessment on Paper-pen test : Due weightage to be given to different types of questions (short answer, long answer, MCQ etc.). The questions should include all difficulty levels. (Easy, Average, Difficult and HOTS).

B. Practical assessment based on latest CBSE curriculum would include the following: The students should be asked to conduct experiment from all areas of curriculum. The assessments should be based on the following : Experimental Set up, Observation, Record of observation/data, Analysis of observation/data, Conclusions drawn by the student, Practical Record File, Viva.

C. Continuous Assessment in the following suggested areas :

- (1) **Home assignments/class assignments:** Due weightage to be given to Regularity, Neatness, Presentation, Correctness.
- (2) **Class response may include :** Oral Questioning, Quiz, Worksheets

S.No.	Assessment Method	Areas of Assessment
1.	Oral Questioning : Oral Questions to assess the understanding of the topic	Listening Skills, Clarity of expression, Clarity of concepts, Communication Skills
2.	Quiz : The Class students divided in groups and Questions pertaining to the topic asked to assess the students of a group.	Thinking skills, Alertness, Time management, Application of knowledge, Reasoning skill, Art of quizzing
3.	Worksheets : Use of worksheets to assess the students in the class.	Comprehension, Regularity, Application of knowledge, Attentiveness

(3) **Seminar** : A topic may be divided among eight to ten students for them to research/study and ‘present’ it to all students. e.g. Topic “Improvement in Crop Yields” can be divided into sub-topics for presentation by the students.

(i) Introduction

(ii) Crop Variety Improvement

(iii) Crop Production Management

(iv) Crop Protection Management

Areas of Assessment : Ability to research on the topic, Acquisition of content knowledge, Public speaking, Verbal expression, ICT skills, Leadership quality

Suggested topics based on the curriculum : Animal Husbandry, Diseases and their causes, Sources of energy and overcoming energy crisis. Application of Archimede’s Principle, Physical and Chemistry changes in daily life, separation of mixtures the techniques.

(4) **Symposium** : Students can be asked to ‘present’ papers on the topics of their choice.

Areas of Assessment : Depth of the content, Presentation of the content, Use of audio-visual aids, Expression, Comprehension of the topic.

Suggested Topics based on the curriculum/related to the curriculum : Hygiene to ward off the diseases. Prevention is better than cure, Application of ultrasound, Pressure-its application in daily life, Chemical classification of metals, Atomic models.

(5) **Group Discussion** : A group of ten students can be given a topic to discuss. Students to choose their group leader, a moderator and a recorder. their roles to be clarified. The topic to be thrown open for discussion.

Group leader to ensure all students participate in the group discussion.

Moderator to ensure that there is no cross talk and no two students speak together and all listen to one speaker patiently.

Recorder to record the observation made by all students in the group including his/her own.

Areas of Assessment : Courage to put forth views, Team Work, Respect to peer, Knowledge of content, Appropriate body language, Communication skills, Listening skills.

Suggested Topics : Based on curriculum Or related to the curriculum : Global warming and its impact, Role of students in bringing awareness among community members on : Importance of hygiene, Saving of power and water, Importance of Immunization, Displacement of an object in the absence of any force acting on it. Energy transformation in daily life situations, Laws of chemical combination, Application of Colloids.

(6) **Projects** : The students may be asked to do the investigatory or experimental projects as explained below.

(a) **Investigatory Projects include** : collection of data, Analysis & Interpretation of data, Observation, conclusion and Inference.

Areas of Assessment : Inquisitiveness, Observational skill, Thinking skill (logical, rationale), Analytical, Application of knowledge, Comprehension & Understanding (viva-voce), Computing Skills, Drawing conclusions.

Suggested topics related to the curriculum : Conservation of resources, Factors affecting buoyant force, Application of reflection of sound, Spread of diseases caused by mosquito in the locality, Soil fertility.

(b) **Experimental Projects include** : Identifying problem, Making hypothesis, Testing/experimenting, Observation, Analysis & Interpretation, Conclusion & Inference, Making a theory.

Areas of Assessment : Inquisitiveness, Observational skill, Thinking skill (logical rationale), Analytical, Application of knowledge, Comprehension & understanding (viva-voce), Computing skills, Drawing conclusions, Experimental Skills.

Suggested topics related to the curriculum : Floatation using vegetables, Density of immiscible liquids, vibrating objects produce sound, Location of apical meristem, determination of pH in different sample need in daily life (e.g. soap, lotions, food substances), Separation of substance using paper chromatography.

(7) **Action Plan** : Students of a class to be divided in 5-6 groups to make an action plan. Action Plan includes identifying a problem and making a plan to find a solution. The students to : Identify a problem. Study the causes of the problem, Interact with people (stake holders) associated with the problem, Categorize the problem in terms of – magnitude effect – effect on people – impact of on community. Make a plan to find the solution of the problem. The plan to include, Meeting people, Counselling the people, Listing people/authorities who can help find solutions, Seeking appointments with the authorities to discuss the identified problem and seek their help, A follow up action on the solution of the problem. The work to be divided among the students or all work in group as a unit. Assessment may be done group-wise or student-wise.

Areas of Assessment : Identification of a problem, Concern for the community, Team work, Analysis of the problem, Strategy planned by the students, Self confidence, Speaking skills, Follow up action see concern for people/environment.

Suggested topics related to the curriculum : Smoking among teenagers vis-a-vis health, Sale of cigarettes near schools, Hygiene in and around school, Seepage of water in buildings, Leaking of water pipes, Wastage of electricity, stagnation of water in the coolers, control of contagious/infectious diseases.

(8) **Survey–Collecting information on a relevant topic of study in a group** : Assessment may be done group-wise or student-wise.

Areas of Assessment : Inquisitiveness, Conversational Skills, Public relations, ICT skills, Data collection, Analytical skills.

Suggested topics as general awareness (related to science) : Garbage collection in the locality, Prevalence of diseases in a locality/community, Contamination of water of different areas, consumption/misuse of electricity.

COURSE STRUCTURE (CLASS-IX)

FIRST TERM (April-September)

Marks - 90

First Term	Marks
UNITS	
I. Food	13
II. Matter : Its Nature and Behaviour	29
III. Organisation in Living World	18
IV. Motion, Force and Work	30
Total	90

FIRST TERM PRACTICALS

List of Experiments

- To test
 - the presence of starch in the given food sample
 - the presence of the adulterant metanil yellow in dal
- To prepare
 - a true solution of common salt, sugar and alum
 - a suspension of soil, chalk powder and fine sand in water
 - a colloidal of starch in water and egg albumin in water and distinguish between these on the basis of
 - transparency
 - filtration criterion
 - stability
- To prepare
 - a mixture
 - a compound using iron filings and sulphur powder and distinguish between these on the basis of :
 - appearance i.e. homeogeneity and heterogeneity
 - behaviour towards a magnet
 - behaviour towards carbon disulphide as a solvent.
 - effect of heat.
- To carry out the following reactions and classify them as physical or chemical changes.
 - Iron with copper sulphate solution in water.
 - Burning of magnesium in air
 - Zinc with dilute sulphuric acid
 - Heating of copper sulphate
 - Sodium sulphate with barium chloride in the form of their solutions in water
- To prepare stained temporary mounts of (a) onion peel and (b) human cheek cells and to record observations and draw their labelled diagrams.
- To identify parenchyma and sclerenchyma tissues in plants, striped muscle fibers and nerve cells in animals, from prepared slides and to draw their labelled diagrams.
- To separate the components of a mixture of sand, common salt and ammonium chloride (or camphor) by sublimation.
- To determine the melting point of ice and the boiling point of water.
- To study the third law of motion using spring balances.
- To determine the mass percentage of water imbibed by raisins.

SECOND TERM (October-March)

Marks - 90

Second Term	Marks
UNITS	
I. Matter : Its Nature and Behaviour	17
II. Organisation in Living World	25
III. Motion, Force and Work	36
IV. Our Environment	12
Total	90

SECOND TERM PRACTICALS

List of experiments :

1. To verify laws of reflection of sound.
2. To determine the density of solid (denser than water) by using a spring balance and a measuring cylinder.
3. To establish the relation between the loss in weight of a solid when fully immersed in
 - (a) tap water
 - (b) strongly salty water, with the weight of water displaced by it by taking at least two different solids.
4. To observe and compare the pressure exerted by a solid iron cuboid on sand while resting on its three different faces and to calculate the pressure exerted in the three different cases.
5. To determine the velocity of a pulse propagated through a stretched string/slinky.
6. To study the characteristic of *Spirogyra/Agaricus*, Moss/ Fern, *Pinus* (either with male or female cone) and an Angiospermic plant. Draw and give two identifying features of groups they belong to.
7. To observe and draw the given specimens-earthworm, cockroach, bony fish and bird. for each specimen, record
 - (a) one specific feature of its phylum
 - (b) one adaptive feature with reference to its habitat.
8. To verify the law of conservation of mass in a chemical reaction.
9. To study the external features of root, stem, leaf and flower of monocot and dicot plants.
10. To study the life cycle of mosquito.

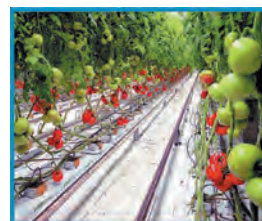
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FIRST TERM

1. IMPROVEMENTS IN FOOD RESOURCES

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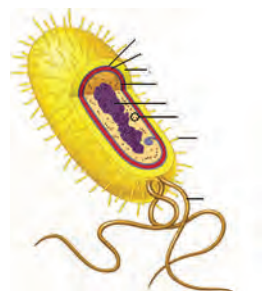
Sustainable Agriculture and Organic Farming, Improvement in Yields [Crop Production, Management (Nutrient Management), Crop Improvement for Higher Yield Through Genetic Manipulation, Crop Protection Management], Manures and Fertilisers, Manures (FYM, Compost, Green Manure), Fertilisers (Nitrogenous, Phosphatic, Potassic, Complex, Biofertilizers), Irrigation (Advantages Factors Controlling Irrigation, Irrigation Systems), Water Augmentation (Rain-Water Harvesting, Water Shed Management), Cropping Patterns, (Mixed Cropping, Inter Cropping, Crop Rotation, Plant Breeding for High-Yielding Crops, Crop Protection Management, [Weed Control, Insect Pest Control, Diseases of Crop Plants (Seed-Borne, Soil-Borne, Air-Borne and Water-Borne Diseases)], Control of Crop Diseases, Storage of Grain, Animal Husbandry, Cattle Farming [Breeds of Cows, Breeds of Buffaloes, Breed Improvement, Farm Management Practices (Components of Cattle Feed, Diseases of Cattle and Buffaloes (Parasitic ; Infectious)], Poultry Farming, Poultry Breeders, Varietal Improvement, Egg and Boiler Production, Housing Shelter and Feed, Diseases of Poultry, Fish Production (Marine Fisheries, Aquaculture, Inland Fisheries, Composite Fish Culture, Bee Keeping, Products Obtained from Apiculture, Honeybee Varieties used for Bee Keeping, Management For High Yields of honey, Diseases and Enemies of Honeybee, Summary, Formative Assessment, Summative Assessment, NCERT Textbook Questions and Exercises with Answers, Questions Based on NCERT Question Bank, Questions of CBSE Sample Paper, Paper Pen Test, Revision Questions, Value Based Questions with Answers.



2. THE FUNDAMENTAL UNIT OF LIFE : CELL

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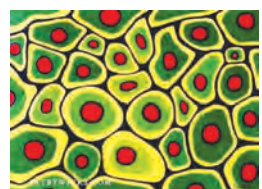
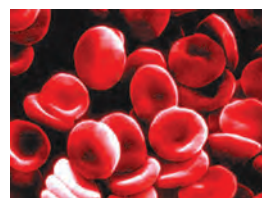
What is the Living Being Made of ? Prokaryotic and Eukaryotic Cell, Structure of Cell, Plasma Membrane, Cell Wall, Nucleus, Cytoplasm, (Cell Organelles viz. Endoplasmic Reticulum, Ribosomes, Golgi Apparatus, Lysosome, Mitochondria, Plastids, Chloroplasts, Vacuoles, Peroxisomes, Centrosomes), Differences Between Plant and Animal Cells, Important Facts About Cells, Summary, Formative Assessment, MCQs and Viva-Voce Based on Practical Skills, Some Activity Based Questions, Paper Pen Test, Summative Assessment, NCERT Textbook Questions and Exercises with Answers, Questions Based on NCERT Question Bank (Exemplar Problems in Science), Questions of CBSE Sample Paper, Some Typical or Illustrative Questions, Questions Based on Higher Order Thinking Skills (HOTS), Revision Questions, Value Based Questions with Answers.



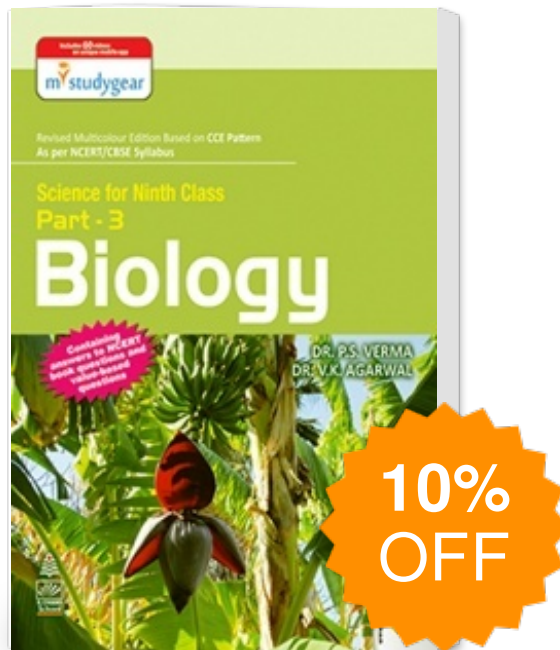
3. TISSUES

122-172

Division of Labour, Plant Tissues (Meristematic and Permanent), Meristematic Tissues (Apical, Lateral, Intercalary), Permanent Tissues (Simple, Complex), Simple Permanent Tissues (Parenchyma, Collenchyma, Sclerenchyma), Complex Permanent Tissues (Phloem, Xylem); Phloem (Sieve Tubes, Companion Cells), Xylem (Xylem Vessels, Tracheids) Differences Between Xylem and Phloem, Animal Tissues (Epithelial, Muscular, Connective and Nervous Tissue). Epithelial Tissue (Squamous, Cuboidal, Columnar, Granular and Ciliated); Muscular tissue (Striated, Unstriated and Cardiac), Connective Tissue [Areolar (Tendon, Ligament); Adipose; Skeletal (Cartilage, Bone); Fluid (Blood, Lymph)], Summary, Formative Assessment, Summative Assessment, Questions Based on NCERT Question Bank, Questions Based on NCERT Textbook Questions and Exercises with Answers, Questions of CBSE Sample Paper, Questions Based on High Order Thinking Skills (HOTS), Paper Pen Test, Revision Questions, Value Based Questions with Answers.



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Manjit Kaur

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