

**Sadguru Gadage Maharaj College, Karad (Autonomous
Institute)**

Reaccredited by NAAC with 'A+' Grade

New Syllabus

B. Sc. I

Under Choice Based Credit System (CBCS)

Sem I

BZT-101 Animal Diversity-I

BZT-102 Animal Physiology

BZP-103 Practical I

Sem II

BZT-201 Cell Biology

BZT-202 Genetics

BZP-203 Practical II

**Syllabus to be implemented from June, 2019
onwards**

Details of Courses Undergraduate Program (B.Sc.)

Course	Credits
	Theory + Practicals
I. Core Course (14 Papers) 4 core X 2 semester = 8 Core for B.Sc. I 3 core X 2 semester = 6 Corefor B.Sc. II	(8 X 4 = 32) (6 X 4 = 24) 32 + 24= 56
Core Course Practical (14 Practical) 4 core X 2 semester = 8 Corefor B.Sc. I 3 core X 2 semester = 6 Corefor B.Sc. II	(8 X 2 = 16) (6 X 3 = 18) 16 + 18= 34
II. Elective Course (4 Papers)	4x4= 16
Elective Course Practical (4 Practical)	4 X 4= 16
III. Ability Enhancement Courses 1. Ability Enhancement Compulsory (5 Papers of 2 credits each) Environmental Science English/MIL Communication	5 X 2= 10
2. Skill Enhancement Course (Skill Based) (4 Papers of 2 credits each)	4 X 2= 08
	Total credit= 140

Sadguru Gadage Maharaj College Karad (Autonomous)
Syllabus for Bachelor of Science Part I

I) Title: Zoology

II) Year of Implementation: 2019-20

III) Structure of Course:

1. Structure of Syllabus:

B.Sc.-I

Semester-I

Sr. No.	Course Title	Theory			Practical		
		Paper No.& Paper Code	No. of lectures Per week	Credits	Course Title	No. of lectures per week	Credits
1	Zoology	Paper-I: BZT 101	3	2	Practical Paper – I : BZP103	8	4
		Paper-II: BZT 102	3	2			

B.Sc.-I

Semester-II

Sr. No.	Course Title	Theory			Practical		
		Paper No.& Paper Code	No. of lectures Per week	Credits	Course Title	No. of lectures Per week	Credits
1	Zoology	Paper-III: BZT 201	3	2	Practical Paper – II: BZP203	8	4
		Paper-IV: BZT 202	3	2			

Note: B: B. Sc. T=Theory and P= Practical

B.Sc. I (Sem.I and Sem II) Evaluation Pattern 2019-2020

Course/Subject	TH/ PR	CCE		SEE		Total	
		Max	Min	Max	Min	Max	Min
BZT-101 Animal Diversity	TH	10	04	30	12	40	16
BZT-102 Animal Physiology	TH	10	04	30	12	40	16
BZT-201 Cell Biology	TH	10	04	30	12	40	16
BZT202 Genetics	TH	10	04	30	12	40	16
BZP-103 Practical I	PR	---	---	45	18	45	18
BZP-203 Practical II	PR	---	---	45	18	45	18

Rayat Shikshan Sanstha's
Sadguru Gadage Maharaj College, Karad

Syllabus for Bachelor of Science Part – I

1. TITLE: ZOOLOGY

2. YEAR OF IMPLEMENTATION: 2019-2020

3. PREAMBLE:

- 1) To impart the knowledge of animal science to the pupils.
- 2) To make the pupils to use the knowledge in their daily life.
- 3) To make the pupils aware of natural resources and environment.
- 4) Application of knowledge in Zoology for nutrition, agriculture & livestock.
- 5) To provide practical experiences which form a part of their learning processes.
- 6) To develop aptitude for scientific work & ability to pursue studies far beyond graduation.
- 7) To encourage the pupils to take life science as a carrier which is the need now a days.
- 8) To make the pupils fit for the society.
- 9) In Autonomous the addition of more syllabus will be very helpful to students which will improve their knowledge in-depth.
- 10) To inculcate in the students highest values of life, understand the human niche in nature and apply the knowledge of life sciences for betterment of society.
- 11) To inspire students to reach frontiers of life sciences through commitment, hard work, study and research.

4. GENERAL OBJECTIVES OF THE COURSE:

- 1) To impart knowledge is the basic aim of education. The students are expected to acquire the knowledge of animal science, natural phenomenon, manipulation of nature & environment by man.
- 2) Understanding the scientific terms, concepts, facts, phenomena & their interrelationships.
- 3) Applications of the knowledge.
- 4) To develop skills in practical work, experiments & laboratory materials, instruments.
- 5) To develop interests in the subject & scientific hobbies.
- 6) To develop scientific attitude which is the major objective. This makes the students open minded, critical observations, curiosity, thinking etc.
- 7) Abilities to apply scientific methods, collection of scientific data, problem solving, organize science exhibitions, club etc.
- 8) Appreciation of the subject, contributions of scientists, scientific methods, scientific programs etc.

5. Programme Outcomes

1. This course includes basics in Classification of Non-chordates.
2. This course includes fundamentals of animal physiology of Nervous system, Digestive system, Respiration Excretion and Cardiovascular system.
3. This course present structure of cell and cell organelles, and evolution and evolutionary theories.
4. This course present introduction to genetics, post Mendelian genetics, Mutation and sex determination.

6. DURATION:

*The course shall be full time course.

*The duration of course shall be three years.

7. PATTERN:

Pattern of Examination will be semester for theory and for practical with **internal assessment** scheme (Project/seminar/field visit)

8. MEDIUM OF INSTRUCTION:

The medium of instruction shall be in English

9. STRUCTURE OF COURSE:

1) FIRST SEMESTER ----- (NO. OF PAPERS 2)

B.Sc. I – Zoology

First year – No. of papers: Two

Paper – I ANIMAL DIVERSITY – I

Paper- II PHYSIOLOGY

2) SECOND SEMESTER ----- (NO. OF PAPERS 2)

B.Sc. I – Zoology

First year – No. of papers: Two

Paper – III CELL BIOLOGY AND EVOLUTIONARY BIOLOGY

Paper – IV GENETICS

Structure and Titles of Papers of B.Sc. Course:

B.Sc. I Semester I - PAPER I: ANIMAL DIVERSITY – I

PAPER II: PHYSIOLOGY

**B.Sc. I Semester II - Paper III: CELL BIOLOGY AND EVOLUTIONARY
BIOLOGY**

PAPER IV: GENETICS

OTHERFEATURES:

A) LIBRARY:

Reference and Textbooks, Journals and Periodicals, Reference Books for Advanced Books for Advanced studies. –List Attached

B) SPECIFIC EQUIPMENTS:

1. Necessary to run theCourse.
2. Computer, LCD, Projector, Visualizer, Smartboard

c) Laboratory Equipment's:

1. CompoundMicroscopes
2. DissectingMicroscope
3. Necessary PermanentSlides
4. NecessaryCharts
5. DissectionBox
- 6.Necessary Stains andChemicals.

SADGURU GADAGE MAHARAJ COLLEGE, KARAD

AN AUTONOMOUS COLLEGE

CBCS SYLLABUS WITH EFFECT FROM JUNE 2019

B.Sc. Part – I Semester – I

ZOOLOGY

DSC – I A (ANIMAL DIVERSITY – I AND PHYSIOLOGY)

Marks :100

(Credits : 04)

Paper – I ANIMAL DIVERSITY – I

Learning Objectives:

1. Student should able to explain classification.
2. Student should able to define various terms.
3. Student should able to draw various figures
4. Student should able to summarize what he learn

UNIT 1 :

Kingdom Protista

(5hrs.)

General characters and classification up to classes; Locomotory Organelles and locomotion in Protozoa

Phylum Porifera

(4 hrs.)

General characters and classification up to classes; Canal system in *Sycon*

Unit II

Phylum Cnidaria

(3 hrs.)

General characters and classification up to classes ; Polymorphism in Hydrozoa

Phylum Platyhelminthes

(6 hrs.)

General characters and classification up to classes ; Life history of *Taeniasolium* and its parasitic Adaptations

Unit III

Phylum Nemathelminthes

(4 hrs.)

General characters and classification up to classes ; Life history of *Ascarislumbricoides* and its parasitic adaptations

Phylum Arthropoda

(5 hrs.)

General characters and classification up to classes ; Vision in Arthropoda ,Metamorphosis in insects

Unit IV

Phylum Annelida

(2 hrs.)

General characters and classification up to classes ;Metamerism in Annelida

Phylum – Mollusca

(2 hrs)

General characters and classification up to classes ; Torsion in gastropods

Phylum – Echinodermata

(2hrs)

General characters and classification up to classes ; Water vascular system in Asteroidea

Organic Farming –

(3 hrs)

Organic waste , Types of Earthworm , Preparation of Vermicompost bed , Preparation of vermiwash.

DSC – I B Paper– II PHYSIOLOGY

Learning Objectives:

1. Student should able to learn various physiological processes.
2. Student should able to define various terms of physiology
3. Student should able to draw various figures
4. Student should able to summarize what he learn.

Unit I

Nerve and muscle

(9hrs)

Structure of a neuron , Resting membrane potential , Origin of Action potential and its propagation in non- myelinated nerve fibres , Ultra-structure of skeletal muscle , Molecular and chemical basis of muscle contraction

Unit II

Digestion

(9 hrs)

Physiology of digestion in the alimentary canal; Absorption of carbohydrates, proteins, lipids

Unit III

Respiration

(4hrs)

Pulmonary ventilation, Transport of oxygen and carbon dioxide in blood

Excretion

(5 hrs)

Structure of nephron, Mechanism of urine formation, Counter – current Mechanism

Unit IV

Cardiovascular system

(6 hrs)

Composition of blood, Structure of heart, origin and conduction of the cardiac impulse, cardiac cycle

Blood Pressure

(2 hrs)

Measurement of systolic & diastolic pressure, cardiac output

ECG measurement

(1 hrs)

Physiological measurement & significance

Suggested Readings for Paper I and II:

Ruppert and Barnes, R. D. (2006) ,*Invertebrate Zoology*, VIII Edition . Holt Saunders

International Edition.

- Barnes, R.S.K. , Calow , P., Olive, P.J.W. , Golding ,D. W. and Spicer , J.I.(2002). *The Invertebrates: A New Synthesis* , III Edition , Blackwell Science
- Young , J.Z.(2004). *The Life of Vertebrates*, III Edition. Oxford university press.
- Pough H . *Vertebrate life*, VIII Edition , Pearson International.
- Hall B.K. and Hallgrimsson B. (2008). Strickberger's Evolution .IV Edition , Jones and Barlett publishers Inc. Tortora , G.J. and Derrickson , B.H.(2009). Principles of Anatomy and Physiology, XI Edition , John Wiley & Sons , Inc.
- Widmaier, E.P., Raff , H. and Strang , K.T.(2008) Vander's Human Physiology , XI Edition, McGrawHill
- Guyton, A.C. and Hall, J.E.(2011). Textbook of Medical Physiology, XII Edition , Harcourt Asia Pvt .Ltd /W.B. Saunders Company
- R.L. Kotpal. Invertebrate Zoology 10th Edition.
- Dhami. Invertebrate Zoology 10th Edition.
- E.L. Jordan. Invertebrate Zoology 12th Edition

SADGURU GADAGE MAHARAJ COLLEGE, KARAD
AN AUTONOMOUS COLLEGE
CBCS SYLLABUS WITH EFFECT FROM JUNE 2019
B.Sc. Part – I Semester – II
ZOOLOGY
DSC –I B (CELL BIOLOGY, EVOLUTIONARY BIOLOGY AND GENETICS)
Marks :100 (Credits : 04)

Paper –III CELL BIOLOGY AND EVOLUTIONARY BIOLOGY

Learning Objectives:

1. Student should able to learn about cells and cell organelles.
2. Student should able to define various terms.
3. Student should able to draw various figures
4. Student should able to summarize what he learns.

UNIT 1 :

Cell Structure (4 hrs)

Cell theory and diversity in cell size and shape

Structure of Nucleus (2 hrs)

Nucleus with reference to Nuclear membrane, Nucleolus, Chromatin and nucleolus .

Structure of Chromosome (3 hrs)

With reference to morphology and organization (Nucleosome), Polytene Chromosome

Unit II

Ultra Structure and Functions of the following (6 hrs)

Plasma membrane (Fluid mosaic model)

Mitochondria

Endoplasmic reticulum

Golgi complex

Lysosome

Diseases related chromosomes abnormality (3 hrs)

Sex linked, Autosomes linked

UNIT III

History of life (3 hrs)

Major Events in History of Life

Introduction to Evolutionary Theories (6 hrs)

Lamarckism, Darwinism, Neo- Darwinism

Unit IV

Direct Evidence of Evolution (4 hrs)

Types of fossils, Incompleteness of fossil record; dating of fossils

Extinction (5 hrs)

Mass extinction (Causes, Names of five major extinctions, K-T extinction in detail), Role of Extinction in evolution

DSC- 2 B PAPER IV GENETICS

Learning Objectives:

1. Student should able to know about Genetics.
2. Student should able to define various terms of Genetics.
3. Student should able to draw various figures
4. Student should able to summarize what he learns.

UNIT I :

Introduction to Genetics (1hrs.)

Mendel's work on transmission of traits, Genetic variation, Molecular basis of Genetic information

Mendelian and postMendelianGenetics (8 hrs.)

Principles of Inheritance, Incomplete dominance and co-dominance, gene interaction, Multiplealleles w.r.t. ABO ,Rh blood groupsandcoatcolour in rabbit , sex linked inheritance .

Unit II

Linkage, Crossing over (9hrs.)

Linkage and process of crossing over, Coupling and repulsion theory, Cytological evidences of crossing over.

UNIT III

Mutations (6hrs)

Chromosomal mutations:Deletion , Duplication , Inversion , Translocation , Aneuploidy and polyploidy ,induced gene mutation.

Genetic Counseling (3hrs)

Importance

Unit IV

SexDetermination (9hrs)

Chromosomal theory of sex determination e.g. Insects, Genetic counseling- Color blindness, Premarital Genetic Counseling.

Total Periods - 60

Suggested Readings for Paper III and IV :

- De Robertis EDP and De Robertis EME – Cell and MolecularBiology
- C.B. Powar – Cell biology , Himalaya Pub.House
- VermaP.S.andAgarwal V .K. – Genetics , S. Chand andcompany
- Strickberger – Genetics . C Millianpublications
- Winchester –Genetics Oxfordpublication
- Cell biology –Dr. N .Arumugam
- Genetics byP.P.Meyyam
- P.S.Verma&V.K.Agarwal-Cell biology , genetics , molecularbiology
- Evolution andEcology
- R.P. Meyyan , N , Arumugam – Genetics &Evolution
- P.K. Gupta – Cell and MolecularBiology

- Gardner , E.J., Simmons , M.J., Snustad , D.P.(2008), Principles of Genetics ,VIII Edition ,WileyIndia.
- Snustad , D.P. Simmons, M.J. (2009), 'Principles of Genetics', V Edition , JohnWiley and SonsInc.
- Klug , W .S ., Cummings , M.R. Spencer ,C.A.(2012),Concepts of Genetics. X Edition, BenjaminCummings.
- Russell , P.J.(2009), Genetics A Molecular Approach III Edition.BenjaminCummings.
- Griffiths , A.J.F. , Wessler , S.R. Lewontin , R.C. and Carroll , S.B. introductionto Genetic Analysis. IX Edition , W.H. Freeman andCo.
- Ridley, M.(2004), Evolution, III Edition , BlackwellPublishing
- Barton , N.H. Briggs , D.E.G., Eisen , J.A. , Goldstein ,D.B. and Patel,N.H.(2007). Evolution .Cold spring ,Harbour Laboratory Press.
- Hall , B.K. and Hallgrimsson ,B.(2008). Evolution .IV Edition ,Jones andBartlett Publishers
- Campbell ,N.A. and Reece J.B.(2011),Biology , IX Edition , Pearson ,Benjamin ,Cummings.
- Douglas, J. Futuyma (1997), Evolutionary Biology ,SinauerAssociates.

Nature of Question Paper:

1. CCE-I : Marks =10: Unit I:n Descriptive short questions(2X5)
 2. CCE-II : Marks =10: Unit II & III :Multiple choice questions: Online Examination :(1X10)
 3. SEE: Marks=50: Unit1 to4
- Q. 1. Multiple choice questions (1X10)
 Attempt any two out of three(2X10=20)
 Attempt any four out of six(4X5=20)

SADGURU GADAGE MAHARAJ COLLEGE, KARAD

CBCS SYLLABUS WITH EFFECT FROM JUNE 2019

B.Sc. Part –I

ZOOLOGY PRACTICALS

MARKS -45(credits: 02)

DSC – A : LAB Semester I Practical I

1. Study of the following specimens:

- i. Study of *Amoeba*, *Euglena*, *Plasmodium*, *Paramecium*, w.r.t. classification and locomotion
- ii. Study of *Sycon*, *Hyalonema* and *Euplectella*, *Obelia*, *Physalia*, *Aurelia*, *Tubipora*, *Metridium*, *Taeniasolium*, Male and female *Ascaris lumbricoides*, *Aphrodite*, *Nereis*, *Pheretima*, *Hirudinaria*, *Palaemon*, *Cancer*, *Limulus*, *Palaemon*, *Scolopendra*, *Julus*, *Periplaneta*, *Apis*, *Chiton*, *Dentalium*, *Pila*, *Unio*, *Loligo*, *Sepia*, *Octopus*, *Pentaceros*, *Ophiura*, *Echinus*, *Cucumaria* and *Antedon*, w.r.t. classification and morphological peculiarities.

2. Study of the following :

- i. T.S. and L.S. of *Sycon*,
- ii. Life history *Taenia* and *Ascaris* and their parasitic adaptations.

3. Preparations of hemin and hemochromogen crystals.

4. Study Tour: Visit to Natural History Museum and submission of report.

5. Measurement of Blood Pressure by Sphygmomanometer.

6. Recording of ECG.

DSC – B: LAB Semester II Practical II MARKS -45(credits: 02)

7. Identification of ABO and Rh blood groups.

8. Cytological Preparations:

Mitochondria – Stained preparation of mitochondria from onion peeling / Hydrilla leaf / Oral mucosa by using Janus Green B .

Polytene Chromosome – Stained preparation of polytene chromosome larva / *Drosophila* larva.

9. Study of fossil evidences from plaster cast models and pictures.

10. Darwin's Finches with diagrams / cut outs of beaks of different species.

11. Study of Mendelian Inheritance and gene interactions (Non Mendelian Inheritance) using suitable examples . Verify the results using Chi – square test , Study of Linkage , recombination, gene mapping using the data (minimum 10 Examples on Mono , Dihybrid ratio , Incomplete dominance, Codominance, Multiple alleles , Sex linked inheritance , Linkage and crossing over and Gene interaction).

12. Study of Human Karyotypes.

13. Study of Human Genetic traits (any five)

Learning Objectives:

1. Student should be able to know scientific terms, concepts, facts, phenomena & their interrelationships.
2. Student should be able to define, explain scientific methods, collection of scientific data.
3. Student should be able to know physiological measurement related to body.
4. Student should be able to summarize what he learns.

Books Recommended

• Ruppert and Barnes , R. D. (2006) , *Invertebrate Zoology*, VIII Edition . Holt Saunders International Edition.

- Barnes, R.S.K. , Calow , P., Olive, P.J.W. , Golding ,D. W. and Spicer , J.I.(2002).
- *The Invertebrates: A New Synthesis* , III Edition , Blackwell Science
- Young , J.Z.(2004). *The Life of Vertebrates*, III Edition. Oxford university press.
- Pough H . *Vertebrate life*, VIII Edition , Pearson International.
- Hall B.K. and Hallgrimsson B.
(2008). *Strickberger's Evolution*. IV Edition, Jones and Barlett publishers Inc.
- Practical Zoology by Kotpal.
- Practical Zoology by Verma & Agarwal.
- Physiology by C.C. Chattarji . Vol. I & II.

SADGURU GADAGE MAHARAJ COLLEGE, KARAD

CBCS SYLLABUS WITH EFFECT FROM JUNE 2019

B.Sc. Part –I

ZOOLOGY PRACTICALS

MARKS -45(credits: 02)

DSC – A : LAB Semester I Practical I B.Sc P1

1.Study of the following specimens :

- i. Study of *Amoeba* ,*Euglena* ,*Plasmodium*,*Paramoecium*, w.r.t. classification and locomotion
- ii. Study of Sycon, *Hyalonema* and *Euplectella*, *Obelia*, *Physalia* ,*Aurelia* ,*Tubipora*, *Metridium* ,*Taeniasolium* , Male and female *Ascaris lumbricoides* , *Aphrodite* ,*Nereis* , *Pheretima* ,*Hirudinaria* ,*Palaemon* ,*Cancer* , *Limulus* ,*Palamnaeus*, *Scolopendra* , *Julus* ,*Periplaneta* ,*Apis*,*Chiton*,*Dentalium* ,*Pila* ,*Unio* , *Loligo* , *Sepia* , *Octopus* ,*Pentaceros* ,*Ophiura* ,*Echinus*,*Cucumaria* and *Antedon*, w.r.t. classification and morphological peculiarities.

i. Student should be able to know about unicellular animal their locomotion.

ii. Student can know about adaptation of animals.

iii. Student can know about disease caused by parasitic animals and their control measures.

iv. Student should be able to identify, describe, morphological peculiarities, classification and functions of organisms/animals.

v. Student should be able to draw the diagrams.

2. Study of the following:

i. T.S. and L.S. of Sycon,

ii. Life history *Taenia* and *Ascaris* and their parasitic adaptations.

i. Student should be able to identify, describe, morphological peculiarities, classification and functions of organisms/animals.

ii. Student can know about disease caused by endoparasitic adaptation and their control measures.

iii. Student should be able to draw the diagrams.

iv. Student should be able to know about different canal system.

v. Student should be able to know about preparation of slides of spicules etc.

3. Preparations of hemin and hemochromogen crystals.

i. It is important in medico legal test for the detection of blood.

ii. It helps to give an opinion as to proof whether a stain is blood or something else.

iii. It is also useful in the difference of bloods of different species depending upon the shape of the crystal

iv. It can be used to detect blood traces

4. Study Tour: Visit to Natural History Museum and submission of report.

i. Student can observe animals in their natural habitat.

ii. Study tours can be a great way to learn new things about different cultures and be aware of certain differences between them, as well as similarities

iii. The trip can reinforce what a teacher has been instructing in class about a subject and help students understand the topic better

iv. Teachers turn trips into mobile classrooms, instructing students to collect data, then quizzing

them or assigning a project based on what they learned during the outing.

v. Taking students into a new environment gives them the experience of traveling in a group and teaches them to be respectful of the locations they visit.

5. Measurement of Blood Pressure by Sphygmomanometer.

- i. Blood pressure measurement is a basic clinical procedure.
- ii. Student should be able to know about Blood pressure
- iii. Student can understand about how to measure it with device.

6. Recording of ECG.

- i. Student should be able to detect different types of arrhythmias (conduction blocks, fibrillations, flutters, varieties of tachycardias).
- ii. Monitoring the effects of a heart medication
- iii. Student should be able to know about ECG and different waves in ECG.
- iv. ECG is used to "gate" the scanning so that the anatomical position of the heart is steady.

DSC – B : LAB Semester II Practical II MARKS -45(credits: 02)B.Sc P2

7. Identification of ABO and Rh blood groups.

- i. Blood typing is important to know about blood transfusion.
- ii. Student should be able to know their own blood group.

8. Cytological Preparations:

Mitochondria – Stained preparation of mitochondria from onion peeling / Hydrilla leaf / Oral mucosa by using Janus Green

B .Polytene Chromosome – Stained preparation of Polytene chromosome larva / Drosophila larva .

- i. Student should be able to know about cell organelle.
- ii. Student should be able to know about preparation of slides.

9. Study of fossil evidences from plaster cast models and pictures.

- i. Student should be able to know about traces of extinct organisms, such as burrows, shells, plants, trails and tracks.
- ii. Student should be able to know about different fossils by observing.

10. Darwin's Finches with diagrams / cut outs of beaks of different species.

Student should be able to know about different species by observing the cutouts.

11. Study of Mendelian Inheritance and gene interactions (Non Mendelian Inheritance) using suitable examples . Verify the results using Chi – square test , Study of Linkage , recombination, gene mapping using the data (minimum 10 Examples on Mono , Dihybrid ratio , Incomplete dominance, Codominance

, Multiple alleles, Sex linked inheritance, Linkage and crossing over and Gene interaction).

- i. Student should be able to know about different interactions between genes.
- ii. By solving examples student will understand how genes come from parents and their expression.
- iii. Student should be able to know about their blood groups by solving examples of multiple alleles.

12. Study of Human Karyotypes.

i. Student can know about chromosomes.

ii. Student can know about size, shape and numbers of chromosomes.

iii. Student can be able to understand about the defects if extra chromosome is present.

13. Study of Human Genetic traits (any five)

Student can be able to understand about the defects if extra or missing chromosome.