GUJARAT UNIVERSITY

DISCIPLINE SPECIFIC COURSES (CORE) THEORY

EFFECTIVE FROM JUNE-2023

B.SC. SEMESTER – I ZOOLOGY – 111T (THEORY)

DSC-C-ZOO-111T (4 CREDIT)

[ANIMAL DIVERSITY, ANIMAL PHYSIOLOGY, WILDLIFE BIOLOGY & GENETICS]

Programme Outcome:

Students will gain education and skill in the fundamentals of animal sciences, understands the complex interactions among various living organisms.

Course outcome:

The students would be able to learn systematic and diversity of various animal classes and their interaction with environment.

Unit I: Animal Diversity

- Outline of Taxonomic categories in hierarchial arrangement (from Kingdom to Species)
- Difference between Chordates and Non-chordates
- Animal diversity (Nonchordates) – Systematics
    - Protozoa - General characters and Classification
    - Type study : Paramecium
      - Systematic position with salient features
      - External & Internal structure (in brief)
      - Locomotion
      -Food & feeding mechanism
      -Osmoregulation
      -Reproduction: Binary fission and Conjugation

Unit II: Animal Physiology – Digestive System

- Anatomy - Overview of Digestive System
- Physiology - Digestion and Absorption of following dietary components in mammals: Carbohydrates, Proteins, Lipids, Nucleic acids
- Histology of Liver, Stomach, Pancreas, Intestine
- Dentition in Mammals – Definition, Differentiation (based on shape & according to attachment of teeth), Succession of teeth, types of teeth (Canine, Premolar, Molar & Incisors), Dental formula (Human, Horse, Dog)

Unit III: Wildlife Biology

- Difference between National Parks and Sanctuaries
- National Parks and Sanctuaries of Gujarat
    - Marine National Park of Gujarat, Velavadar National Park, Gir National Park and Sanctuary, Vansda National Park, Wild ass Sanctuary of Gujarat and Nalsarovar Bird Sanctuary
      [Location, Area (sq.km), Major faunal diversity]
- Biosphere Reserves of India
    - Three zones (Core, Buffer and Transitional)
    - List of Biosphere Reserves of India

- IUCN Red data list
    - Only categories [Extinct, Critically Endangered, Endangered, Vulnerable, Least concerned]
- Animal Conservation Projects – Project Tiger, Cheetah Re-introduction Project

Unit IV: Genetics

- Mendelian inheritance (Experiments on Pea plants)
- Incomplete dominance (e.g. *Mirabilis jalapa*)
- Co-dominance (e.g. Roan cattle)
- Multiple alleles
    - e.g.- ABO blood groups in human
    - Rh Factor- Erythroblastosisfoetalis
- Concept of Gene
- Complementary genes (Flower colour in *Odoratus lathyrus*)
- Epistasis (Dominant e.g. Dog and Recessive e.g. Coat colour in Mice)
- Extra chromosomal inheritance (Kappa particles in Paramecium & Shell coiling in Snail)
- Human pedigree analysis

GUJARAT UNIVERSITY

DISCIPLINE SPECIFIC COURSES (CORE) PRACTICALS,

EFFECTIVE FROM JUNE-2023

B.SC. SEMESTER – I ZOOLOGY – 112P (PRACTICALS)

DSC-C-ZOO-112P (4 CREDIT)

[PRACTICALS BASED ON THEORY PAPER: DSC-C-ZOO-111T]

I. ANIMAL DIVERSITY (Nonchordates) – Systematics:

- Identification & classification of invertebrates (Kingdom to Class):
  Protozoa: Amoeba, Paramecium, Polystomella, Euglena, Vorticella, Plasmodium.
- Preparation and Observation of Protozoan culture
- Paramoecium: W. M., Binary fission and conjugation

II. Animal Physiology – Digestive System

- Action of human salivary Amylase (ptyalin) on Starch
- Study through permanent slides: Liver. Pancreas, Stomach, Intestine
- Dentition in Mammals(Study through Specimens/Charts)
  - Dental formula (Human, Horse, Dog)

III. Wildlife Biology

- National Park & Sanctuary (as per theory syllabus) spotting in map of Gujarat.
- Identification of Animal Evidences in the field: Pug marks, Hoof marks, Scats, Nests, Antlers in near-by area.

IV. Genetics:

a) Study of genetics through charts (example as per theory syllabus).

- Monohybrid cross
- Dihybrid cross
- Incomplete dominance
- Co-dominance
- Multiple alleles
- Complementary genes
- Epistasis (Dominant and Recessive)
- Extra chromosomal inheritance (Through chart)
- Human pedigree analysis (through chart)

b) Genetics problems

1. In guinea pig a dominant gene B produces black and its recessive allele b produces white. What are the possible mating types? What is the genotype and phenotype of the F1 offspring?

Solution Hint : Possible mating type :

1. BB × BB ; 2. BB × Bb ; 3. BB × bb ; 4. Bb × Bb ; 5. Bb × bb ; 6. bb × bb

2. In rabbit, the colored coat (C) is dominant to albino coat (c). What type of offspring would you expect if cross a pure line colored rabbit, with an albino rabbit ? Show both genotypes in the first and second generations.

Solution Hint : P : CC × cc 1st generation : Cc- colored 2nd generation : CC-colored Cc-

Colored ; cc - albino

3. Red fruit (R) is dominant to yellow (r) and tallness (T) is dominanat over short (t) in plants. What phenotypic and genotypic ratio would result if one of the parent plants is red homozygous & tall homozygous and other is red heterozygous & tall heterozygous?

Solution Hint : P: RRTT × RrTt ; Result : Same Phenotype in all offspring, and

Genotype = RRTT, RRTt, RrTT, RrTt.

4. In the mouse the gene for colored coat (C) is dominant to the gene for albino (c) and the gene for straight whiskers (W) is dominant to the allele for bent whiskers (w). Find out the phenotypes of the following crosses. 1. Ccww × ccww 2. ccww × ccWw 3. CcWw ×CcWw

Solution Hint : 1st Cross : colored & bent whiskers. 2nd Cross: albino & straight whiskers ; albino & bent whiskers. 3rd cross : colored & straight whiskers ; colored & bent whiskers ; albino & straight whiskers ; albino & bent whiskers

5. In four o'clock plants, red colour of flowers (R) is incompletely dominant over white (r), the heterozygous having pink flower color. What will be the offsprings in a cross between plants of red flowers and pink flowers?

Solution Hint : P – RR × Rr Offspirngs : Red and Pink

6. A roan bull is bred to three cows. Cow A has the same genotype as the roan bull. Cow B is red and cow C is white.What proportions of roan progeny are expected from each of the above three crosses ?

Solution Hint : In all three crosses 50 % Roan cows are expected.

7. A couple preparing for marriage, a man has blood group B and woman has A. They ask you what type of blood group their children may have. What would you tell them and how would you explain your conclusions?

Solution Hint : - All four A, B, AB , & O types of blood groups are possible if both parents are heterozygous

- AB and A are possible if man is heterozygous and woman is homozygous.

- AB and B are possible if man is homozygous and woman is heterozygous.

8. Two white flowered varieties of pea plant when crossed produced purple flowered in F1 progeny. Selfing of F1 plants produced total 112 progeny of which 62 plants with purple flowers and 50 with white flowers. Find out :
   (i) What type of interaction is involved?
   (ii) Give a phenotypic ratio approximated by the f2 progeny.
   (iii) Give the genotype of the parents.

Solution Hint :

(i) Complementary gene interaction;
(ii) Phenotypic ratio - 9:7 ;
(iii) P : CCpp × ccPP

9. In a Plant, the gene for white fruit color (W) is epistatic to yellow (Y) which is dominant over green (y). Determine the fruit color of the offsprings of following crosses.

I. Wwyy × wwyy ; II. wwYy × wwyy ; III. WwYy × WwYy

Solution Hint : 1st Cross : White & green ; 2nd Cross : Yellow & green ;
3rd Cross : White: Yellow : green (12:3:1)

10. When dogs from a true breeding brown coat line were mated to dogs from a true breeding white coat line, all F1 progeny were with white coat color. Mating of F1 progeny produced F2 offsprings having phenotypes in the ratio of 132 white: 33 black: 11 brown. Explain results.

Solution Hint : Cross : BBII × bbii Where B = Black; I=epistatic and bb= brown

Here dominant epistatic gene I inhibit the expression of associated genes.

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