

# VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT.

## ANIMAL SCIENCE

### M.Sc. - II

### Paper V - A

### Functional Anatomy

### Section - I

#### Unit - I (15 hrs.)

(a) Movement and locomotion invertebrates.

- i. Movement and fibrils
- ii. Movement and hydrostatic skeleton
- iii. Movement and coelom
- iv. Movement and arthropodization

(b) Structural adaptations with reference to certain modes of locomotion.

- i. Swimming
- ii. Running
- iii. Flying

#### Unit II (15 hrs.)

Food, feeding habits and mechanisms:

- i. Nutrition in some lower metazoan
- ii. Filter feeding
- iii. Vertebrate feeding apparatus, Dentition in animals
- iv. Comparative functional anatomy of vertebrate digestive system.

#### Unit III(15 hrs.)

- i. Comparative account of excretory system
- ii. Comparative account of respiratory system
- iii. Comparative account of nervous system

### Section - II

#### Unit IV(15 hrs.)

- i. Patterns of reproduction in invertebrates
- ii. Comparative account of chordate reproductive system
- iii. Larvae and larval behaviours

#### Unit V(15 hrs.)

Osmoregulatory mechanisms in various environments:

- i. Fresh water
- ii. Marine
- iii. Terrestrial

#### Unit VI(15 hrs.)

Physiological adaptations to extreme environmental conditions:

- i. Desert: a. Desert rat, b. Camel
- ii. Temperature regulation in reptiles
- iii. Adaptations to cold

### References :

1. Invertebrate structure and function E, J.W.Barrington
2. General and comparative physiology W.S.Hoar
3. Comparative anatomy Kluge
4. Vertebrate morphology Webster & Webster
5. Vertebrate adaptations Scientific American readings

# VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT.

## ANIMAL SCIENCE

### M.Sc. - II

#### Paper VI - A

#### Neuro endocrinology, Behaviour and Wild-life Conservation.

##### Section - I

##### Neuro endocrinology and Behaviour

###### Unit I (6 hrs.) Chemical coordination:

- i. Neurohumors
- ii. Hormones
- iii. Neuro hormones

###### Unit II(9 hrs.) Endocrine organs and hormonal regulation:

- i. Invertebrates
- ii. Vertebrates
- iii. Chemistry of hormones

###### Unit III(30 hrs.)

- A. Mechanism of animal behaviour:
  - i. Basic patterns of behaviour
  - ii. Nervous integration
  - iii. Learning
  - iv. Physiological basis of behaviour
  - v. Genetic basis of behaviour
- B. Specialized behavioural adaptations:
  - i. Navigation (Homing)
  - ii. Orientation (Bat 'radar')
  - iii. Communication
    - Visual
    - Auditory
    - Chemical (Pheromones)

##### Section - II

##### Wild Life Conservation

###### Unit IV (15 hrs.)

- i. Wild-life habitate – definition and importance of habitat studies, habitat Management principles and practices with special reference to India
- ii. Methods of studying free-living animal (birds and mammals) in their Natural habitats.
- iii. Animal capture techniques, scope and utility, trapping, netting noozing, Chemical immobilization etc.

###### Unit-V(15 hrs.)

- i. Marking and tagging animals for study. Radiolocation, telemetry, Importance, scope and methodology.
- ii. Principles and practices of wild-life management in national parks and Sanctuaries in India.
- iii. Wild life of India: Basic facts of biology common and zoological Names, Population status, distribution feeding and breeding habits Importance from conservation point of view and main threats to their Ecological role.

## Unit-VI (15 hrs.)

- i. Wild-life conservation projects of GOI: Project, tiger, Gir lion project, Project hangul, Himalayan musk deer project, Manipur deer project, their scope and success.
- ii. The legislative process and provision in India. (Wild life protection act and forest act); the Indian Board of Wild-life and administrative set up At National and State levels.
- iii. Elephant sanctuary/parks.
- iv. National parks & sanctuaries of Gujarat.
- v. Wild ass sanctuary/park of India.

## References :

- |   |  |
|---|--|
| 1. Hormones   | A.W.Norman and G.Litwick (1987)        |
| 2. Animal behaviour: An evolutionary approach                             | John Alcock (1984)                     |
| 3. Evolution of brain and behaviour                                       | R.B.Masterton, M.E.Bitterman           |
| 4. Vertebrates  | C.B.G./Campbell, N.Hotton (1976)       |
| 5. Biology of communication   | D.Brain Lewis, D.Michael Grover (1980) |
| 6. Animal Architecture and building behaviour                             | H.M.Hansell (1984)                     |
| 7. Applied Biology  | T.H.Coaker (1976)                      |
| 8. Ecology and biogeography in India                                      | M.S.Mani (1974)                        |
| 9. The cheetan: The biology, ecology & behaviour of an endangered species | R.L.Eaton (1974)                       |
| 10. Wild life wealth of India (Resources and management)                  | T.C.Majupuria (1986)                   |

# VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT.

## ANIMAL SCIENCE

### M.Sc. - II

### Paper VII - A

### Embryology & Histology

#### Section - I

#### Embryology

##### Unit I (10 hrs.)

- i. Historical perspective of the science of embryology
- ii. Spermatogenesis
- iii. Oogenesis
- iv. Fertilization

##### Unit II(15 hrs.)

- i. Types of eggs and patterns of cleavage
- ii. Basic concepts of growth and differentiation
- iii. Dynamics of gastrulation
- iv. Primary embryonic induction and concept of organizer

##### Unit III(20 hrs.)

- i Limb morphogenesis
- ii Metamorphosis (amphibian & insect)
  - Morphogenesis
  - Hormonal control
  - Biochemical indices
- iii Regeneration
  - Distribution
  - Cellular basis
  - Control mechanisms

#### Section - II

#### Histology

(Microscopic anatomy of the following tissues at light & electron microscopic level with functional bias with respect to mammals.)

##### Unit-I (25 hrs.)

- i. Epithelial tissue : Simple & compound epithelial, specialized epithelial cells, intercellular connections between the epithelial cells, general biology of epithelial tissue, biology of main types of epithelial cells, the glands.
- ii. Connective tissue: Embryonic connective tissue, adult connective tissue, reticular connective tissue, and functions of connective tissue.
- iii. Muscular tissue: Striated muscle, cardiac muscle and smooth muscle.
- iv. Nervous tissue: Neurons, synapses, neuroglia, nerve fibres, nerve ending, neurosecretory cells, neuroepithelial cells.

##### Unit –II(15 hrs.)

- i. Skin: Epidermis, dermis, hypodermis, colouration of skin, skin glands, hairs, nails.
- ii. Digestive system: The oral cavity, tongue, pharynx, general structure of digestive tract oesophagus, stomach, intestine, large intestine, salivary glands, pancreas, liver. Gall bladder.
- iii. Respiratory system: Nose, nasal cavity, nasopharynx, larynx, trachea, bronchii, and the lungs pleura.
- iv. Circulatory system : General structure of heart and blood vessels and lymph vascular system.

**Unit – III(15 hrs.)**

- i. Excretory system: The kidneys, the nephrons, histology of various parts of the nephrons and collecting tubules, ureter, urinary bladder, the urethra (male and female).
- ii. Reproductive system: Male reproductive system; the scrotum, testis and Associated structure; the prostate gland; bulbo-urethral glands, the penis. Female reproductive system: the ovary, oviducts, uterus, vagina, labia and associated glands, bulbs of vestibule, mammary gland.
- iii. The endocrine glands; The thyroid, parathyroid, adrenal, pituitary, islets of Langerhans, endocrine function of non-endocrine gland.

**References :**

- |                           |   |
|---------------------------|---|
| 1. Developmental Biology  | J.W.Saunders                            |
| 2. Animal Development     | Hopper & Hart                           |
| 3. Embryology             | B.I.Belinsky                            |
| 4. Developmental Biology  | S.G.Goyal                               |
| 5. Text book of histology | N.N.Majumdar                            |
| 6. Text book op histology | W.F.Windle                              |
| 7. Histology              | R.O.Greep                               |
| 8. Basic histology        | L.C.Junquiera, J.Carbeuro & Cantapoulos |

# VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT.

## ANIMAL SCIENCE

### M.Sc. - II

#### Paper VIII - A

#### Entomology (Special Paper)

##### Unit I (15 hrs.)

- i. Origin and classification of insects – Salient features of all the orders with representative examples.
- ii. Insects as the most successful group of animals.
- iii. Integument: Structure, composition and functions of cuticle.

##### Unit II (15 hrs.)

- i. Head capsule: Segmentation
- ii. Insect mouth parts: Comparative
- iii. Insect antennae: Comparative – Sensillae
- iv. Wings: Origin, venation
- v. External genitalia

##### Unit III(15 hrs.)

- i. Insect digestive system
  - \*Salient features
  - \*Comparative anatomy
  - \*Nutrition
  - \*Physiology of digestion
- ii. Insect excretion: Physiology
- iii. Insect circulatory system
  - \*Associated structure
  - \*Haemolymph: Composition, function and evolutionary significance
- iv. Insect respiratory system:
  - \*Anatomy
  - \*Physiology

##### Unit IV (15 hrs.)

- i. Insect reproductive system:
  - \*Anatomy
  - \*Physiology
  - \*Types of reproductive
- ii. Insect embryonic development: Gastrulation
- iii. Insect neuroendocrinology:
  - \*Anatomy
  - \*Neurohormonal
  - \*Role in reproduction, diapause, metamorphosis & growth

##### Unit V (15 hrs.)

- i. Pests: Fruits: mango, sapota  
Stored grains  
Crops: Paddy, cotton, sugarcane
- ii. Medically important insects: with emphasis on order Diptera
- iii. Control considerations:
  - \*Chemical;
  - \*Biological
  - \*Biotechnological
  - \*IPM

- iv. Bionomics of silkworm
- v. Bionomics of lac insect
- vi. Bionomics of locust
- vii. Social insects

**Unit VI (15 hers.)**

- i. Photoreception:
  - \*Anatomy
  - \*Physiology
- ii. Bioluminescence
  - \*Distribution
  - \*Biological role
- iii. Chemical communication
- iv. Sonication

**References :**

- |                                     |                         |
|-------------------------------------|-------------------------|
| 1. Text book of entomology          | A.D.Imms                |
| 2. Outlines of entomology           | A.D.Imms                |
| 3. Indian insect life               | L.H.Maxwell             |
| 4. The biology of ion sects         | G.H.Carpenter           |
| 5. Principles of insect morphology  | R.E.Snodgress           |
| 6. Biochemistry of insects          | D.Gilmour               |
| 7. Insect physiology                | V.B.Wigglesworth        |
| 8. Physiology of insecta Vol.I to V | M.Rockstein             |
| 9. Destructive and useful insects   | C.I.Metcalf & W.P.Flint |

# VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT.

## ANIMAL SCIENCE

### M.Sc. - II

#### Paper VIII - A

#### Fishery Biology (Special Paper)

#### Section - I

##### Unit I (20 hrs.)

- i. General characters and classification of fishes
- ii. Fresh water fisheries
  - \*Catla
  - \*Rohu
  - \*Mrigal
  - \*Prawn
  - M.rosenbergii
- iii. Marine fisheries
  - \*Bombay duck
  - \*Pomfret
  - \*Ghol-dara
  - \*Placuna-oyster
  - \*Pearl oyster
  - \*Mudskipper
  - \*Prawn fisheries
- iv. Fishery statistics

##### Unit II (10hrs.)

##### Unit II (10 hrs.)

- i. Food and feeding habits of fishes
- ii. Fish and prawn nutrition
- iii. Induced breeding in fishes and prawn
  - \*Hatchery
  - \*Spawning and rearing
  - \*Culturing
- iv. Plankton culture

##### Unit III (15 hrs.)

- i. GSI, Fecundity, R.factor, ova count and ova diameter
- ii. Ecto and endo parasites of fishes
- iii. Fish and prawn diseases
- iv. Fish pathology

#### Section - II

##### Unit IV (15 hrs.)

- i. Fishing techniques
- ii. Fishing gears and crafts for fresh water
- iii. Fishing gears and crafts for marine water
- iv. Navigation and trawling
- v. Classification of fishing vessels

##### Unit V (15 hrs.)

- i. Estuarine pollution and its effect on fishery resources
- ii. Pollution and sea fishery
- iii. Over fishing problem

## **Unit VI (15 hrs.)**

- i. Fishery economics
- ii. Processing technology
- iii. Fishery marketing and export potential

### **References :**

- |   |                      |
|---|----------------------|
| 1. Fish nutrition                         | J.E.Hawag            |
| 2. Fish diseases                          | W.S.Oxanag           |
| 3. Fish nutrition & Food                  | FAO : Rome           |
| 4. Marine pollution                       | R.Johuston           |
| 5. Water toxicology                       | V.V.Metelev          |
| 6. Physiology of fishes                   | W.S.Hoar and Randall |
| 7. Fish and fisheries of India            | V.G.Jhingran         |
| 8. Ichthyology                            | K.F.Lagler           |
| 9. Prawn culture                          | MPEDA Publ.          |
| 10. Plankton culture                      | MPEDA Publ.          |
| 11. Fish culture                          | MPEDA Publ.          |
| 12. Methods of diagnosis of fish diseases | B. Lucky             |
| 13. Prawn fisheries                       | P.J.Kurian           |

# VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT.

## ANIMAL SCIENCE

### M.Sc. - II

### Paper VIII - A

#### (Human Cytogenetics Special Paper)

#### Unit I (12 hrs.)

- i. Histological background of human chromosomes.
- ii. Chromosome structure and various models
- iii. Human meiotic chromosome

#### Unit II (12 hrs.)

- i. Cytogenetics techniques of human chromosome
- ii. Genetic inactivation of heterochromatin
- iii. Human chromosome and genetic map

#### Unit III (18 hrs.)

- i. Autosomal abnormalities of group G (chromosome-21)
- ii. Autosomal abnormalities of group D (chromosome-13 to 15)
- iii. Autosomal abnormalities of group E (chromosome-16 to 18)

#### Unit IV (18 hrs.)

- i. Abnormal sex chromosome complements in the male
- ii. Abnormal sex chromosome complements in the female
- iii. The sex chromosome and intersexuality in man
- iv. Cytogenetic of human pregnancy wastages.

#### Unit V (12 hrs.)

- i. Chromosomal breakage and instability syndromes.
- ii. Chromosomal basis of human neoplasias with reference to
  - \*Lekemias
  - \*Lymphomas
  - \*Carcinomas

#### Unit VI (18 hrs.)

- Recent advances in human cytogenetics
- \*Human genome project (HGP)
  - \*Telomers
  - \*Human cloning
  - \*Stem cell culture
  - \*Human artificial chromosome
  - \*Gene-testing
  - \*Gene therapy
  - \*Spectral karyogram (FISH technique)

#### References :

1. Human cytogenetics Vol. I & II J.L.Hamerton
2. Chromosome and cancer from molecules to man J.D.Fowley & J.E.Ultman (Ed.)
3. Chromosome mutation and neoplasia J.German (Ed.)
4. The consequences of chromosome imbalance C.J.Epstein
5. Advances in chromosome and cell genetics A.K.Sharma & A.Sharma
6. Cytogenetic assays of environmental mutagens I.H.Porter and E.B.Hook
7. Services and education in medical genetics A.A.Sansberg
8. The chromosomes in human cancer and leukaemia A.A.Sansberg
9. Recent results in cancer research M.Schwab, H.Rabes, K.Munk and P.H.Hofchneider (Eds.)
10. Diagnosis cytogenetics (Lab manual) R.D.Wegner
11. Human chromosomes O.J.Miller and E.Truman