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**VEER NARMAD SOUTH GUJARAT UNIVERSITY**  
University Campus, Udhna-Magdalla Road, SURAT - 395 007, Gujarat, India.

**વીર નર્મદ દક્ષિણ ગુજરાત યુનિવર્સિટી**

યુનિવર્સિટી કેમ્પસ, ઉપના-મગદલા રોડ, સુરત - ૩૯૫ ૦૦૭, ગુજરાત, ભારત.

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## **-: પરિપત્ર :-**

વિજ્ઞાન વિદ્યાશાખા હેઠળની ઝૂઓલોજી વિષય ચલાવતી સંલગ્ન સ્નાતક કોલેજોના આચાર્યશ્રીઓને જણાવવાનું કે, શૈક્ષણિક વર્ષ ૨૦૧૯-૨૦ થી અમલમાં આવનાર F.Y.B.Sc.(Zoology) નો અભ્યાસક્રમ ઝૂઓલોજી વિષયની અભ્યાસસમિતિની તા.૨૪/૭/૨૦૧૮ ની સભાનાં ઠરાવ ક્રમાંક: ૩ અન્વયે નીમેલ પેટાસમિતિએ તૈયાર કરેલ એફ.વાય.બી.એસસી. સેમ.-૧ અને સેમ.૨ Paper- Z-101 અને Paper- Z 201 તથા Paper -Z 102 અને Paper - Z-202, ઝૂઓલોજી અભ્યાસસમિતિનાં ચેરમેનશ્રીએ અભ્યાસસમિતિની મંજૂરીની અપેક્ષાએ અભ્યાસસમિતિવતી મંજૂર કરી વિજ્ઞાન વિદ્યાશાખાને કરેલ ભલામણ વિજ્ઞાન વિદ્યાશાખાની તા.૦૨/૦૫/૨૦૧૯ ની સભાનાં ઠરાવ ક્રમાંક: ૧૦ અન્વયે સ્વીકારી એકેડેમિક કાઉન્સિલને કરેલ ભલામણ એકેડેમિક કાઉન્સિલએ તેની તા.૦૭/૦૬/૨૦૧૯ની સભાના ઠરાવ ક્રમાંક: ૪૮ અન્વયે સ્વીકારી મંજૂર કરેલ છે. તેની જાણ સંબંધકર્તા શિક્ષકો અને વિદ્યાર્થીઓને કરવી, તદ્દુપરાંત તેનો અમલ કરવો.

### **વિજ્ઞાન વિદ્યાશાખાની તા.૦૨/૦૫/૨૦૧૯ ની સભાનાં ઠરાવ ક્રમાંક: ૧૦**

:: આથી ઠરાવવામાં આવે છે કે, પેટાસમિતિએ તૈયાર કરેલ એફ.વાય.બી.એસસી. સેમ.-૧ અને સેમ.૨ Paper- Z-101 અને Paper- Z 201 તથા Paper -Z-102 અને Paper - Z-202, ઝૂઓલોજી શૈક્ષણિક વર્ષ ૨૦૧૯-૨૦ થી અમલમાં આવનાર અભ્યાસક્રમ સ્વીકારી એકેડેમિક કાઉન્સિલને ભલામણ કરવામાં આવે છે.

### **એકેડેમિક કાઉન્સિલની તા.૦૭/૦૬/૨૦૧૯ ની સભાનાં ઠરાવ ક્રમાંક: ૪૮**

:: આથી ઠરાવવામાં આવે છે કે, વિજ્ઞાન વિદ્યાશાખાએ તેની તા. ૦૨/૦૫/૨૦૧૯ ની સભાના ઠરાવ ક્રમાંક : ૧૦ અન્વયે ભલામણ કરેલ એફ.વાય.બી.એસસી. સેમ.-૧ અને સેમ.૨ Paper- Z-101 અને Paper- Z 201 તથા Paper -Z-102 અને Paper - Z-202, ઝૂઓલોજી શૈક્ષણિક વર્ષ ૨૦૧૯-૨૦ થી અમલમાં આવનાર અભ્યાસક્રમ સ્વીકારી મંજૂર કરવામાં આવે છે.

બિડાણ: ઉપર મુજબ

ક્રમાંક : એકે./પરિપત્ર/૧૦૩૬૩/૧૯

તા. ૨૦-૦૬-૨૦૧૯

ઈ.ચા. કુલસચિવ

પ્રતિ,

- ૧) વિજ્ઞાન વિદ્યાશાખા હેઠળની ઝૂઓલોજી વિષય ચલાવતી સંલગ્ન સ્નાતક કોલેજોના આચાર્યશ્રીઓ.
- ૨) અધ્યક્ષશ્રી, વિજ્ઞાન વિદ્યાશાખા
- ૩) પરીક્ષા નિયામકશ્રી, પરીક્ષા વિભાગ, વીર નર્મદ દ. ગુ. યુનિવર્સિટી, સુરત.

.....તરફ જાણ તેમજ અમલ સારૂ.

**VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT.**  
**SYLLABUS FOR F. Y. B. Sc. SEMESTER- I**  
**Z – 101: ZOOLOGY-THEORY**  
**(Effective from JUNE-2019)**  
**(Systematics and Animal Diversity)**

**UNIT- I: Systematics**

Salient features of Non-chordates, structural organization in different phylum of Non-chordates with examples.

Kingdom – Animalia;

Phylum – Protozoa- Locomotory Organelles and locomotion

Porifera-Canal System in sycon

Cnidaria-Polymorphism in Hydrozoa

Platyhelminthes, Nematelminthes-parasitic adaptations

Annelida-Metamerism

Arthropoda -Metamorphosis in Insects

Mollusca-Torsion in gastropods

Echinodermata-Water-vascular system in Asteroidea, Protochordata- General features and Phylogeny

**UNIT- II: Non-Chordate Animal Diversity**

**Type study – *Fasciola hepatica* (Liver fluke)**

- Systematic position, Habit and habitat
- External features, Body wall
- Digestive system, Respiratory System, Excretory system, Nervous system
- Reproductive system, Life cycle and development
- Pathogenesis, Parasitic Adaptations

**UNIT-III: Systematics**

Salient features of Chordate classes with examples.

Agnatha, Pisces, Amphibia, Reptiles, Aves, Mammals.

**UNIT- IV: Chordate Animal Diversity**

Pisces-Difference between Osteichthyes and Chondrichthyes, osmoregulation

Amphibia- Parental care

Reptiles- Poisonous and non-poisonous snakes

Aves- Flight adaptations in birds

Mammals- Origin of mammals

**VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT.**

**SYLLABUS FOR F. Y. B. Sc. SEM- I**

**Z – 101: ZOOLOGY-PRACTICALS**

**(Effective from JUNE-2019)**

**(Systematics and Animal Diversity)**

The following practicals are to be taught/studied only with the help of charts, models, videos, photographs, permanent slides, working models etc.

**1. Study of the following specimens:**

*Amoeba, Euglena, Paramecium, Sycon, Hyalonema, Physalia, Aurelia, Metridium, Taenia solium, Male and female Ascaris lumbricoides, Nereis, Pheretima, Hirudinaria*

**2.** *Carcinus, Scolopendra, Limulus, Lepisma, Periplaneta, Butterfly, Chiton, Dentalium, Pila, Ostrea, Octopus, Pentaceros, Ophioderma, Echinus, Cucumaria.*

**3.** *Balanoglossus, Herdmania, Branchiostoma, Petromyzon, Sphyrna, Pristis, Torpedo, Labeo, Exocoetus, Ichthyophis, Salamandra, Bufo, Hyla,*

**4.** *Chelone, Hemidactylus, Chamaeleon, Vipera, Naja, Crocodylus, Gavialis, Koel, Peacock, Sparrow, Ornithorhynchus, Macropus, Bat, Dolphin*

**5. Study of the following permanent slides:**

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

**Liver fluke:** Larval stages: miracidium, sporocyst, redia, cercaria

**6. Key for Identification of poisonous and non-poisonous snakes**

An “**animal album**” containing photographs, cut outs, with appropriate write up about the above mentioned taxa. Different taxa/ topics may be given to different sets of students for this purpose.

**VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT.**

**SYLLABUS FOR F. Y. B. Sc. SEMESTER- I**

**Z – 102: ZOOLOGY-THEORY**

**(Effective from JUNE-2019)**

**(Cytogenetic, Ecology and Ethology)**

**UNIT-I:**

**Cytology:** Structural organization of cells- Prokaryotes and Eukaryotes  
Introduction to cell organelles (Golgi body, E.R., Mitochondria,  
Nucleus, Lysosome, Ribosome, Nucleolus, Cell wall) and cell inclusions.

**UNIT-II :Genetics**

Types, structures and functions of chromosomes

- i. Principles of inheritance, Mendel's law, deviation from Mendelian inheritance, incomplete dominance and co-dominance, Complementary genes, Epistasis genes, Supplementary genes.
- ii. Concept of gene, multiple alleles (ABO blood groups) lethal alleles, pseudo alleles.

**UNIT-III : Ecology**

- Introduction to Ecology
- Marine Ecosystem
- Wetland Ecosystem
- Fresh water – Pond Ecosystem
- Desert ecosystem

**Ecological Adaptations**

- Terrestrial, Fossorial, Aquatic, Arboreal, Volant, Desert

**UNIT- IV :Ethology**

- Introduction, Scope and patterns of behavior.
- Nesting behavior (Weaver bird, Horn bill) and social behavior (honeybee)
- Behavioral disorders- Alzheimer's and Dementia

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**SYLLABUS FOR F. Y. B. Sc. SEMESTER- I**

**Z – 102: ZOOLOGY-PRACTICALS**

**(Effective from JUNE-2019)**

**(Cytogenetic, Ecology and Ethology)**

The following practicals are to be taught/studied **only** with the help of charts, models, videos, photographs, permanent slides, working models etc.

- (1) Ecological adaptations.
  - (a) Terrestrial: Elephant, Jackal
  - (b) Arboreal: Chameleon, Squirrel
  - (c) Fossorial: Armadillo, Naked mole rat
  - (d) Volant: Flying fish, Crow
  - (e) Desert: Camel, Phrynosoma
- (2) To study structure of typical animal cell and cell organelles: Golgi body, E.R., Mitochondria, Nucleus, Lysosome, Ribosome, Nucleolus, Cell wall.
- (3) To study nesting behaviour (Weaver bird, Horn bill) and social behaviour (Honey bees).
- (4) Blood groups and Rh factor.
- (5) Complementary genes, Epistasis genes, Supplementary genes & Lethal genes.

## **Reference Books:**

- (1) Ruppert and Barnes, R.D. (2006). *Invertebrate Zoology*, VIII Edition. Holt Saunders International Edition.
- (2) 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
- (3) Kardong, K.V. (2005) *Vertebrates' Comparative Anatomy, Function and Evolution*. IV Edition. McGraw-Hill Higher Education.
- (4) Kent, G.C. and Carr R.K. (2000). *Comparative Anatomy of the Vertebrates*. IX Edition. The McGraw-Hill Companies.
- (5) Young, J. Z. (2004). *The Life of Vertebrates*. III Edition. Oxford University press.
- (6) Modern Text Book of Zoology (vertebrate) R.L.Kotpal, Rastogi Publication, Meerut, India.
- (7) Modern Text Book of Zoology (invertebrate) R.L.Kotpal, Rastogi Publication, Meerut, India.
- (8) Invertebrate Zoology- E.L.Jordan & P.S.Verma
- (9) Invertebrate Zoology- T.C. Majupuria, Pradeep Publication, Jalandhar, India.
- (10) Introduction to Chordates- T.C. Majupuria, Pradeep Publication, Jalandhar, India.
- (9) A manual of Practical Zoology Invertebrates- P.S.Verma, S. Chand & Co. Ltd. New Delhi, India.
- (10) A manual of Practical Zoology Chordates- P.S.Verma, S. Chand & Co. Ltd. New Delhi, India.
- (11) Cell biology, Genetics and Molecular Biology- V.B. Rastogi, Rastogi Publication, Meerut- India
- (12) Modern zoology –Dr. Ramesh Gupta, Prakash Publication, 12<sup>th</sup> Edition, Muzaffarnagar (UP)
- (13) A Text Book of Zoology- Dr. Alkesh I. Shah & Dr. Krishna R. Rajput, New Popular Prakashan, Surat, India.

**VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT**  
**SYLLABUS FOR F. Y. B. Sc. SEMESTER- II**  
**Z – 201: ZOOLOGY- THEORY**  
**(Effective from JUNE-2019)**  
**(COMPARATIVE ANATOMY OF CHORDATES, APPLIED ZOOLOGY,  
WILDLIFE BIOLOGY)**

**Unit-1: Integumentary System :**

Derivatives of integument w.r.t. glands and digital tips

**Digestive System :** Brief comparative account of alimentary canal and digestive glands of vertebrates (Pisces to mammals).

**Respiratory System :** Brief account of Gills, lungs, air sacs and swim bladder

**Unit-2: Circulatory System :** Evolution of heart.

**Sense Organs :** Types of receptors- eyes, ears, tongue, skin and nose.

**Unit-3:**

(a) **Human diseases:** Causes, symptoms, prevention and cure:

Dengue, Leptospirosis, Chikungunya, Swine flu

(b) **Applied Zoology:** Importance of poultry farming-Breeds of poultry, Cage system and deep litter system of bird keeping, Egg as food, Care of egg laying hen, poultry appliances and excreta as manure.

**Unit-4:Wildlife Biology:**

- Introduction, causes of depletion of wild life, Importance of conservation of wild life
- Difference between National Parks and Sanctuaries
- **Wildlife in Gujarat:**

**National Parks**

(1) Gir National Park (2) Marine National Park

**Sanctuaries**

(1) Wild ass sanctuary (2) Thol wildlife sanctuary (3) Velavadar black buck Sanctuary (this is national park)

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**SYLLABUS FOR F. Y. B. Sc. SEMESTER- II**  
**Z – 201: ZOOLOGY- PRACTICALS**  
**(Effective from JUNE-2019)**

**(COMPARATIVE ANATOMY OF CHORDATES, APPLIED ZOOLOGY,  
WILDLIFE BIOLOGY)**

The following practicals are to be taught/studied **only** with the help of charts, models, videos, photographs, permanent slides, working models etc.

- (1) Integumentary System:** Derivatives of integument w.r.t. glands and Digital tips.
- (2) Digestive System:** Brief account of alimentary canal and digestive glands
- (3) Respiratory System:** Brief account of Gills, lungs, air sacs and swim bladder
- (4) Circulatory System:** Evolution of vertebrate heart.
- (5) Sense Organs:** Types of receptors- eyes, ears, tongue, skin and nose
- (6) Study of national parks and Sanctuaries**  
Gir N.P., Marine N.P., Wild ass W.L.S., Thol W.L.S. and Velavadar W.L.S
- (7) To study the causes, symptoms, cure and prevention of**  
Dengue, leptospirosis, chikungunya and swine flu.
- (8) To study poultry appliances-** hover canopy type brooder, modern hangingfeeder (plastic), modern hanging water appliance (plastic) and box type candling appliance.

**VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT**  
**SYLLABUS FOR F. Y. B. Sc.**  
**. SEMESTER- II**  
**Z – 202: ZOOLOGY- THEORY**  
**(Effective from JUNE-2019)**

**(LIFE PROCESSES, BIOCHEMISTRY, IMMUNOLOGY AND TISSUE SYSTEM)**

**UNIT-1 Life Processes:**

Nutrition/ Digestion in Human –

- Buccal digestion: Salivary secretion and digestion.
- Gastric digestion: Gastric secretion and digestion
- Intestinal digestion: Pancreatic secretion, bile secretion, digestion in small intestine, digestion and absorption in large intestine.
- Reproduction and its types.

**UNIT-2 Biological Chemistry:**

- pH and Buffers in Biological Systems.
- Control and regulation of metabolism at cell, gene and hormonal level
- Introduction to constituents of balanced diet-Sources, functions and deficiency status.

**UNIT-3 Immunology:**

- Introduction and basic concepts of immunology.
- Cells and organs of immune system.
- Humoral and cellular immune response.
- Innate and acquired immunity.

**UNIT-4 Tissue systems:**

To Study various types, their structure and functions.  
Epithelial, connective, nervous and muscular tissue

**VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT**  
**SYLLABUS FOR F. Y. B. Sc. SEMESTER- II**  
**Z – 202: ZOOLOGY- PRACTICALS**  
**(Effective from JUNE-2019)**

**LIFE PROCESSES, BIOCHEMISTRY, IMMUNOLOGY AND TISSUE SYSTEM**

The following practicals are to be taught/studied **only** with the help of charts, models, videos, photographs, permanent slides, working models etc.

- (1) To study the control of food ingestion in animals and T.S. of intestine of mammals to show villi for absorption.
- (2) To study different salivary glands and their functions in human.
- (3) Diseases due to vitamin deficiency: Xerophthalmia, nyctalopia (Night blindness), rickets, scurvy, beriberi, pellagra.
- (4) To study Different types of reproduction.
- (5) Tissue System: Study of various types of tissues with the help of permanent slides- areolar tissue, adipose tissue, Hyaline Cartilage, Mammalian bone, Medulated and non Medulated nerve fiber.

### **Reference Books :**

- (1) Shukla, G.S. & Upadhyay, V.B. Economic Zoology. Rastogi Publi. 2005, 487 pages.( For Poultry)
- (2) JawaidAhsan, Sinha, S. P. 2008. A Handbook of Economic Zoology. S. Chand and Co. Publ. 272 pages.( For Poultry)
- (3) Ruppert and Barnes, R.D. (2006). *Invertebrate Zoology*, VIII Edition. Holt Saunders International Edition.
- (4)Kardong, K.V. (2005) *Vertebrates' Comparative Anatomy, Function and Evolution*.IVthEdition.McGraw-Hill Higher Education.
- (5) Kent, G.C. and Carr R.K. (2000). *Comparative Anatomy of the Vertebrates*. IX Edition.The McGraw-Hill Companies
- (6) 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
- (7) Young, J. Z. (2004). *The Life of Vertebrates*.III Edition.Oxford University press.
- (8) Modern Text Book of Zoology (vertebrate) R.L. Kotpal, Rastogi Publication, Meerut, India.
- (9) Modern Text Book of Zoology (invertebrate) R.L. Kotpal, Rastogi Publication, Meerut, India.
- (10) Invertebrate Zoology- E.L. Jordan & P.S.Verma
- (11) Invertebrate Zoology- T.C. Majupuria, Pradeep Publication, Jalandhar, India.
- (12) A Text Book of Histology – Leslie P. Gartner-4<sup>th</sup>edi.-Amazone
- (13) Intruduction to Chordates- T.C. Majupuria, Pradeep Publication, Jalandhar, India.
- (14) A manual of Practical Zoology Invertebrates- P.S.Verma, S. Chand & Co. Ltd. New Delhi, India.
- (15) A manual of Practical Zoology Chordates- P.S.Verma, S. Chand & Co. Ltd. New Delhi, India.
- (16)Prani Auotiki (Gujarati)- Desai and Akhunji – University Granth nirman Board- Ahmedabad- India.
- (17) Poultry vigyan- Mehta and Ghasura- University Granth nirman Board- Ahmedabad- India.
- (18) Vanyajiv Vidya ane Vanyajiv Vyavasthapan- Prof, V.C.Soni - University Granth nirman Board- Ahmedabad- India.
- (19) Ecology, Cell biology, Genetics, Animal diversity, Animal Physiology, Immunology, Chordates and Invertebrates- Titles by N.Arumugam, Saras Publi., Kanyakumari, India.
- (20) A Text Book of Zoology- Dr. Alkesh I. Shah & Dr. Krishna R. Rajput, New Popular Prakashan, Surat, India.

**Web references:**

(1) [Comparative Anatomy - Digestive System](#)

<https://www.slideshare.net/emscipriano/comparative-anatomy-digestive-system>

(2) [Comparative Anatomy - Respiratory System](#)

<https://www.slideshare.net/emscipriano/comparative-anatomy-respiratory-system>

(3) [Urogenital system chap](#)

<https://www.slideshare.net/CharmHernandez/urogenital-system-chap>

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