

BHAKTA KAVI NARSINH MEHTA **UNIVERSITY, JUNAGADH**



FACULTY OF SCIENCE

[Three Years (6 Semesters) Full Time Course]

ZOOLOGY SYLLABUS

2020 - 21

Bhakta Kavi Narsinh Mehta University
Junagadh – 362 001
Gujarat, India

Website: www.bknmu.edu.in

BHAKTA KAVI NARSINH MEHTA
UNIVERSITY, JUNAGADH



ZOOLOGY
SYLLABUS

[SYLLABUS FOR THE CHOICE BASED CREDIT SYSTEM (CBCS)]

(T.Y. B.Sc.)

**SEMESTER V – PAPER – Z-501, 502,
503**

New Syllabus

INFORCE FROM JUNE – 2020

FORWARD

In academics, syllabus serves as a roadmap for teaching various topics in a well defined manner. Along with constant changes in the field of subject, it is always required to review and update the syllabus so as to meet changing scenario at regional, national and global levels. In science, higher education at degree level creates base for students to sharpen their skills and enable them for securing employment. Moreover, for a few this also opens a new realm of research and education at post graduation level. Hence, finalizing degree level syllabus requires to keep all these facts in mind.

Here, the current syllabus is finalized after elaborate discussions amongst well qualified and experienced teachers. The syllabus is in line with the syllabi of previous semesters providing seamless learning experience to the students. The present syllabus encompasses latest trends in the subject and is also in tune with UGC's guideline. We are hopeful that students will be able to enhance their knowledge and understating of the subject well.

Board of Studies, Zoology
Bhakta Kavi Narsinh Mehta University,
Junagadh – 362 001

BHAKTA KAVI NARSINH MEHTA UNIVERSITY, JUNAGADH
(CBCS Syllabus)
SEMESTER – V
ZOOLOGY
PAPER – Z-501

Functional Anatomy of Non chordates and Systematic

UNIT- 1: SYSTEMATIC

- Classification of Non-chordates up to order from Protozoa to Hemichordata.

UNIT – 2: FORMS AND FUNCTIONS IN ANIMALS

- General structure and morphology with functional anatomy of following animals.
 - PHYLUM: ARTHROPODA : **Scorpion**: Systematic Position, External Features, Digestive System, Circulatory System, Nervous System and Sense Organs (all appendages, booklungs and Pecten), Reproductive System.
 - PHYLUM: MOLLUSCA:- **Pila**: Systematic position, External Features, Digestive System, Circulatory System, Reproductive System, Nervous System and Sense Organs.

UNIT – 3: PROTOZOA TO COELENTERATA

- **PROTOZOA**: Nutrition, Reproduction and Parasitism in Protozoa. Parasitic protozoans of men with reference to their mode of infection, pathogenacity, prevention and control: *Trypanosoma gambiense*, *Giardia intestinalis*, *Plasmodium vivax*, *Monocystis agilis*.
- **PORIFERA**: Skeleton, Reproduction in sponges.
- **COELENTERATA**: Polymorphism in Coelenterata, Corals and Coral Reefs, Reproduction in Coelenterata.

UNIT – 4: PLATYHELMINTHES TO ARTHROPODA

- **PLATYHELMINTHES**: Life cycle of *Fasciola hepatica* and It's parasitic adaptations.
- **ASCHELMINTHES**: Parasitic nematodes of man- *Trichuris trichiura*, *Trichinella spiralis*, *Ancylostoma duodenale*, *Loa loa*.
- **ANNELIDA**: Segmental organs in Annelida, Asexual reproduction in polychaetes, Regeneration in Annelids.

- **ARTHROPODA:** Larval forms of Crustacea, Metamorphosis in Insects, Economic Importance of Arthropoda.

UNIT – 5: MOLLUSCA TO HEMICHORDATA

- **MOLLUSCA:** Foot in Mollusca, Torsion and Detorsion, Economic Importance of Mollusca, Process of Pearl Formation.
- **ECHINODERMATA:** Larval forms of Echinodermata, Water vascular system with reference to all classes of Echinodermata, Autotomy and regeneration.
- **HEMICHORDATA:-** Tornaria larva, Affinity of Balanoglossus.



Practical No. 1

LIST OF PRACTICALS BASED ON THEORY PAPER – Z-501

Unit-1 Systematic

- Practical: 1 Identify and classify Protozoa upto order
[Euglena, Volvox, Noctiluca, Mastigamoeba, Giardia, Zelleriella, Polystomella, Actinospharium, Monocystis, Myxidium, Coleps, Paramecium, Ephelota, Stentor]
- Practical: 2 Identify and classify Porifera upto order
[Clathrina, Scypha, Farnera, Pheronema, Oscarella, Cliona, Phyllospongia]
- Practical: 3 Identify and classify Coelentrata upto order
[Ceratella, Polycolpa, Millepora, Porpita, Haliclystus, Aurelia, Tubipora, Corallium (Red Coral), Pennatula (Sea Pen), Zoanthus, Actinia, Fungia(Mushroom coral)]
- Practical: 4 Identify and classify Platyhelminthes upto order
[Convoluta, Mesostoma, Bipalium, Gyrodactylus, Fasciola, Aspidogaster, Amphilina, Proteocephalus, Moniezia]
and
Identify and classify Aschelminthes upto order
[Enoplus, Mermis, Monohystera, Trichuris, Rhabditis, Thelazia, Philometra, Microfilaria]
- Practical: 5 Identify and classify Annelida upto order
[Nereis, Chaetopterus, Tubifex, Acanthobdella, Pontobdella, Hirudo]
- Practical: 6 Identify and classify Arthropoda upto order
[Limulus, Agelena, Artemia, Apus, Daphnia, Cyclops, Lucifer, Julus, Lithobius, Lepisma, Mantis, Epimera (may fly), Beetle, Moth, Vespa]
- Practical: 7 Identify and classify Mollusca upto order
[Neopilina, Chaetoderma, Chion, Dentalium, Patella, Pila, Murex, Aplysia, Corolla, Doris, Pyramidella, Lymnaea, Limax, Mytilus, Unio, Tereido, Nautilus, Loligo]
- Practical: 8 Identify and classify Echinodermata upto order
[Astropecten, Ophiura, Palaeodiscus, Diadema, Clypeaster, Holothuria, Echinocardium]
and
Identify and classify Hemichordata upto order
[Balanoglossus, Rhabdopleura, Cephalodiscus]

Unit 2: Forms and functions in animals

- Practical: 9 To study external features, digestive system, nervous system and reproductive system (male and female) of Scorpion.
- Practical: 10 To study mounting appendages, book lungs and pecten of Scorpion.
- Practical: 11 To study external features, digestive system, nervous system, blood vascular system and reproductive system of Pila.
- Practical: 12 To study mounting of Osphradium, Radulla, and Statocyst of Pila.

Unit 3: Preparation from preservative material

- Practical: 13 To identify protozoans from freshwater pool/ditch/pond water.
- Practical: 14 Preparation from preservative material- Protozoa & Porifera
[(a) Protozoa: Giardea, Monocystis,
(b) Porifera: Sponge, Spicules]
- Practical: 15 Preparation from preservative material- Coelenterata, Helminthes & Annelida
[(a) Coelenterata: Hydra with bud, Obelia Medusa,
(b) Platyhelminthes: Tape worm – Gravid segment (w.m.),
(c) Aschelminthes: Lifecycle of Trichinella spiralis,
(d) Annelida: Septal Nephridia].
- Practical: 16 Preparation from preservative material- Mollusca & Hemichordata
[(a) Mollusca: Glochedium and Veliger Larvae.
(b) Hemichordata: Tornaria Larva]
- Practical: 17 To identify fresh water crustacean planktons from freshwater pool/ditch/pond water.

Unit 4 A study of permanent slides and important specimens.

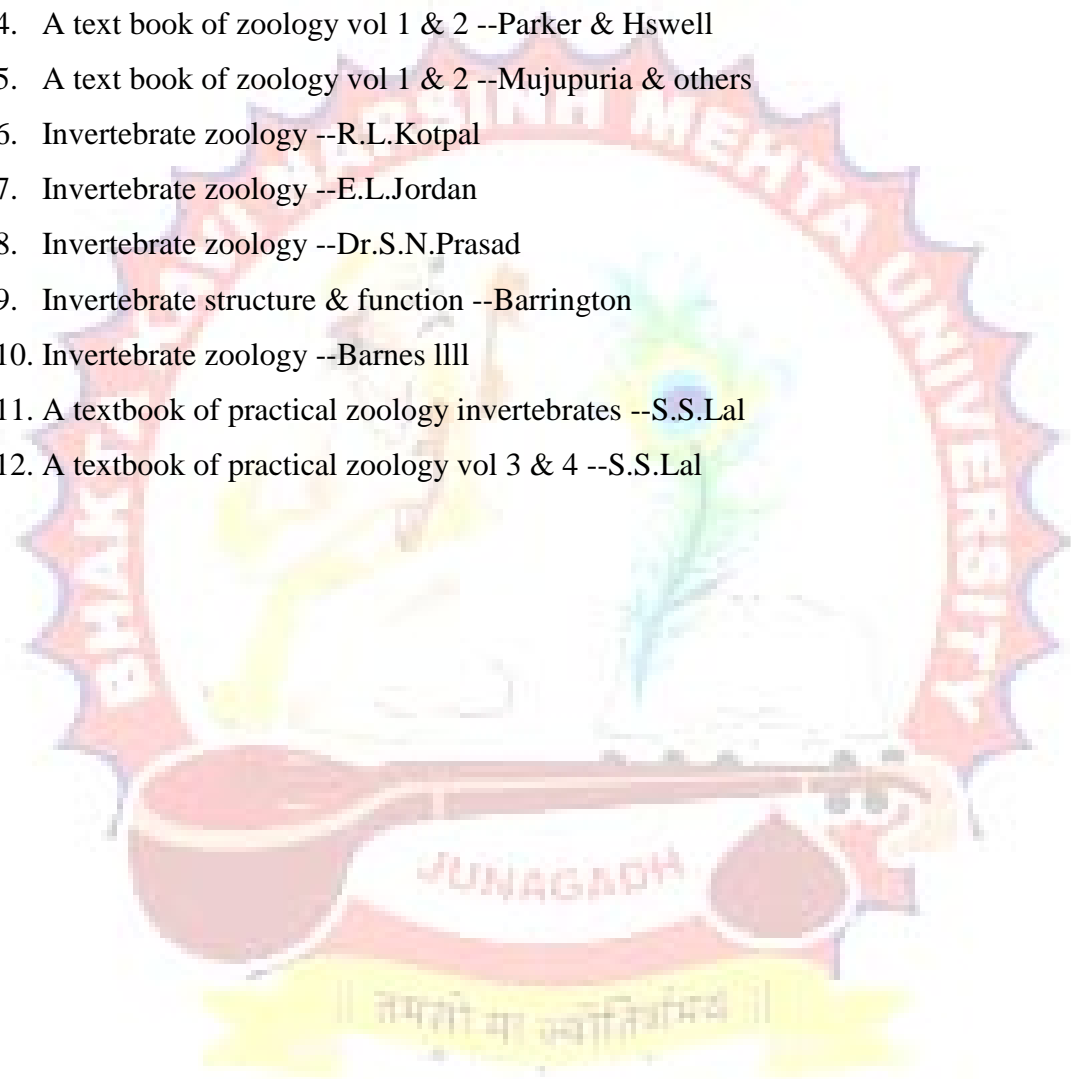
- Practical: 18 A study of permanent slide and important specimen-Part I
[(a) Conjugation in paramecium,
(b) Parenchymula larvae,
(c) Obelia colony (w.m)]
- Practical: 19 A study of permanent slide and important specimen-Part II
[(a) Crustacean larvae: Nauplius, Metanauplius, Protozoaea, Zoaea, Cypris, Mysis, Megalopa, Phyllosoma, Alima,
(b) Lifecycle of Butterfly]

Unit 5 A study of permanent slides and important specimens.

- Practical: 20 A study of permanent slide, chart and important specimen-Part III
[(a) Water vascular system in starfish
(b) Echinoderm larvae: Bipinnaria, Brachiolaria, Ophiopluteus, Echinopluteus, Auricularia, Doliolaria, Doliolaria of Crinoidea,
(c) Process of coiling in a molluscan shell,
(d) Process of pearl formation through chart].

A LIST OF REFERENCES BOOKS FOR PAPER-501

1. The invertebrate vol.1&2 --Hyman, L.H.(Mc Graw Hill)
2. Invertebrate zoology -- Barbes, R.D. (W.B. SaundersCo)
3. Invertebrate zoology --Jordan E.L. & P.S.Verma (S.Chand&Co)
4. A text book of zoology vol 1 & 2 --Parker & Hswell
5. A text book of zoology vol 1 & 2 --Mujupuria & others
6. Invertebrate zoology --R.L.Kotpal
7. Invertebrate zoology --E.L.Jordan
8. Invertebrate zoology --Dr.S.N.Prasad
9. Invertebrate structure & function --Barrington
10. Invertebrate zoology --Barnes llll
11. A textbook of practical zoology invertebrates --S.S.Lal
12. A textbook of practical zoology vol 3 & 4 --S.S.Lal



DISTRIBUTION OF UNITS

SEMESTER – V

PAPER – Z-501

Unit No.	Unit Title	Theory Period	Marks
Unit : 1	SYSTEMATIC	15	14
Unit : 2	FORMS AND FUNCTIONS IN ANIMALS	15	14
Unit : 3	PROTOZOA TO COELENTERATA	14	14
Unit : 4	PLATYHELMINTHES TO ARTHROPODA	14	14
Unit : 5	MOLLUSCA TO HEMICHORDATA	14	14
	TOTAL :	72	70

BHAKTA KAVI NARSINH MEHTA UNIVERSITY, JUNAGADH

THEORY EXAMINATION PAPER STYLE

SEMESTER – V

ZOOLOGY

(Based on Paper – Z-501)

Time: 2½ Hours

Total Marks: 70

Instructions:

1. Illustrate your answer with neat and labeled diagrams.
 2. Figure to the right side indicates full marks of questions.
- ANY TYPE OF MCQs IS NOT INCLUDED IN THIS PAPER STYLE.
 - EACH QUESTION CARRIES EQUAL MARKS – 14.
 - THERE ARE 5 QUESTIONS CONTAINING SUBQUESTIONS (A), (B), (C).

QUESTION-1: (From UNIT-1) [14]

(A) Answer the following question (write any one out of two) (07)

(1)

(2)

(B) Answer the following question (write any one out of two) (04)

(1)

(2)

(C) Answer the following question (write any three out of five) (03)

(1)

(2)

(3)

(4)

(5)

QUESTION-2: (As Above) (From UNIT-2) [14]

QUESTION-3: (As Above) (From UNIT-3) [14]

QUESTION-4: (As Above) (From UNIT-4) [14]

QUESTION-5: (As Above) (From UNIT-5) [14]

BHAKTA KAVI NARSINH MEHTA UNIVERSITY, JUNAGADH

B.Sc. Semester – V
Skeleton for Practical Examination
Practical Paper No. 1 Based on Paper—Z 501

Time : 3 Hrs

Total- 35 Marks

- Que:1 Dissect the given animal and expose the _____ System. Show it to examiner. (Practical no 9 & 11) (06)
- Que:2 Make a temporary mounting of _____ from the given animal. (Practica-10 and 12) (03)
- Que:3 Make a temporary preparation from the given material. Stain it if necessary, Identify and show it to the examiner. (Practical- 13 and 17) (06)
- Que:4 Sketch and label as per instruction. (Practical- 14, 15, 16) (05)
- Que:5 Write as per given instruction. (10)
- (1) Identify and classify giving reason (Practical- 1, 2, 3, 4)
- (2) Identify and classify giving reason (Practical- 5, 6, 7, 8)
- (3) Identify and Describe (Practical-18)
- (4) Identify and Describe. (Practical-19)
- (5) Identify and Describe. (Practical-20)
- Que:6 Certified Journal. (03)
- Que:7 Viva Voce. (02)

BHAKTA KAVI NARSINH MEHTA UNIVERSITY, JUNAGADH

(CBCS Syllabus)

SEMESTER – V

ZOOLOGY

PAPER – Z-502

Fisheries Biology, Animal Husbandry, Wildlife, Biotechnology and Toxicology

UNIT-1 FISHERIES BIOLOGY

- Basis of Aquaculture
- Inland fisheries and fish pond
- Induced breeding
- Nutrition in fish
- Fish feed
- Fish Diseases (Dropsy, Fungus infection, Gill rot, White spot, Costiasis, Argulus diseases)
- Fish By product
- Post harvesting Techniques in fisheries

UNIT-2 ANIMAL HUSBANDRY

- Apiculture
 - o Life cycle of honey bee
 - o Behaviour
 - o Procedure of apiculture
 - o Application
- Pearl culture
 - o Species of pearl Oyster
 - o Culture
- Sericulture
 - o Life history
 - o Rearing of silk worm

UNIT -3 WILDLIFE

- Biodiversity Hotspots
- Endangered and Endemic species of India
- Keystone species
- In-situ and Ex-situ conservation

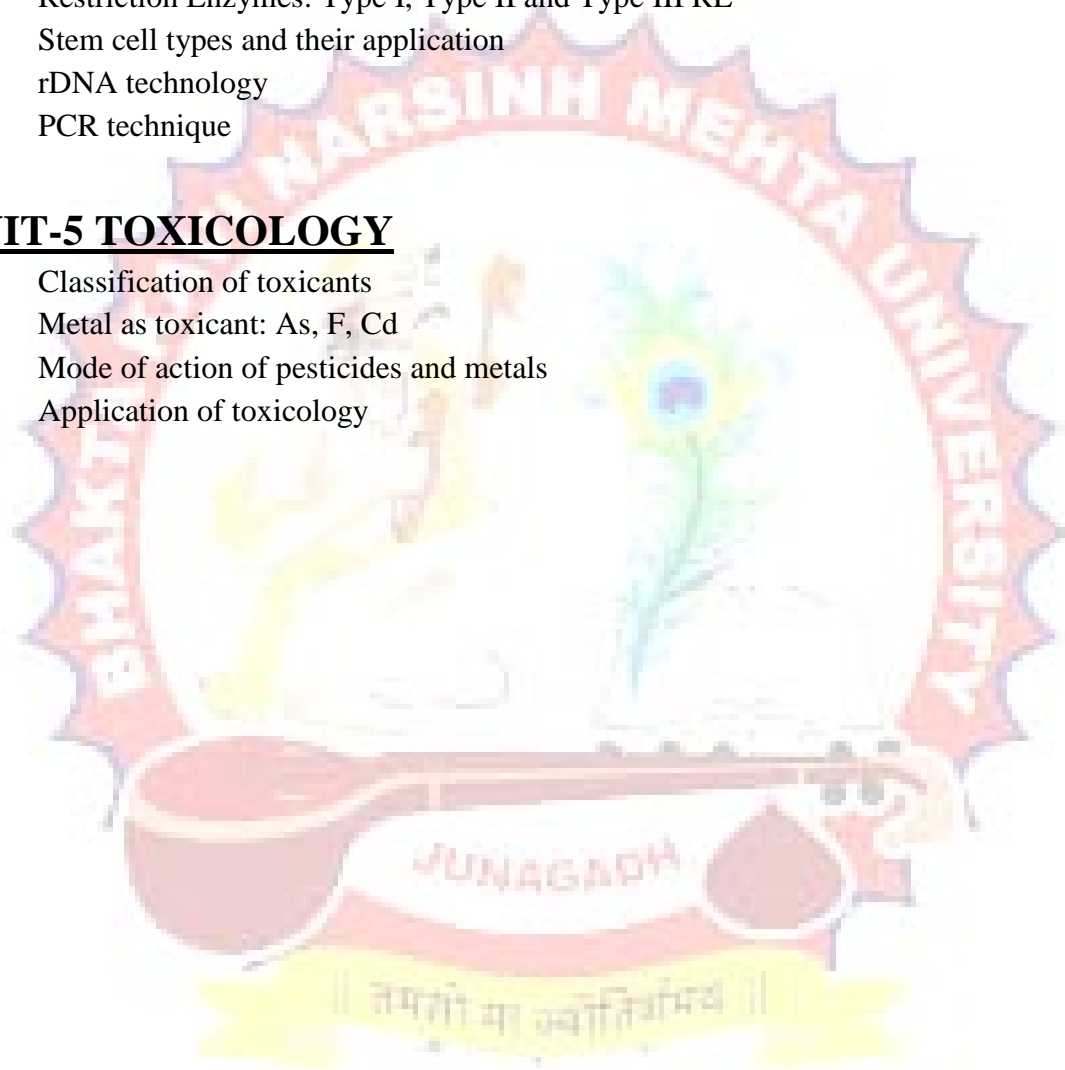
- Wildlife agencies - WWF, Indian Board of wildlife, CITES
- Sanctuaries and National Parks of India.
 - o National Parks : Jim Corbett, Ranthambhor, Periyar, Kaziranga, Kanha
 - o Sanctuaries : Dachigam, Keoladeo, Madhumalai, Chilika lake, Manas

UNIT-4 BIOTECHNOLOGY

- Vectors: YAC, BAC, Plasmid, Bacteriophage, pBR, pUC, Cosmid
- Restriction Enzymes: Type I, Type II and Type III RE
- Stem cell types and their application
- rDNA technology
- PCR technique

UNIT-5 TOXICOLOGY

- Classification of toxicants
- Metal as toxicant: As, F, Cd
- Mode of action of pesticides and metals
- Application of toxicology



Practical No. 2

LIST OF PRACTICALS BASED ON THEORY PAPER – Z-502

Unit -1 Fisheries Biology

- Practical: 1 To study classification of fishes (Part I)
[(1) Tiger Shark (2) Hammer headed shark (3) Electric ray (4) Pristis (5) Trygon (6) Chimera (7) Protopterus (8) Acipensor]
- Practical: 2 To study classification of fishes (Part II)
[(1) Lepidosteus (2) Diadon (3) Labeo (4) Ophiocephalus (5) Anguilla (6) Anabas (7) Syngnathus(8) Ostracion]
- Practical: 3 Important edible fishes and some invertebrate of Saurashtra sea-coast.
[(1) Prawn (2) Lobster (3) Loligo (4) Oyster (5) Pomfret (6) Bombay Duck (7) Ghol fish (8) Dara fish (9) Koth (10) Shark (11) Catla (12) Mrigal]
- Practical: 4 To determine age of fish by scales
- Practical: 5 Study of fish by-product
- Practical: 6 To study post harvesting technique in fisheries

Unit-2 Animal Husbandry

- Practical: 7 To study life-cycle of Honey bee
- Practical: 8 To study Pearl Oyster species and culture (Specimen, chart/Photographs)
- Practical: 9 To study life-cycle of silkworm

Unit-3 Wildlife

- Practical: 10 To study foot print of wild animals
[Lion, Leopard, Tiger, Sambhar, Spotted Deer, Hyena]
- Practical: 11 To study various ecological sampling methods.
[Quadrat sampling, Transect Sampling – Line and Belt, Block count of birds]
- Practical: 12 To study various tools used in wildlife study (charts/photographs)
[Binoculars, Camera, Radio Transmitters/Receivers, Tranquilizers]
- Practical: 13 To study National Parks of India
[Jim Corbett, Ranthambhor, Periyar, Kaziranga, Kanha]
- Practical: 14 To study wild life sanctuaries of India
[Dachigam, Keoladeo, Madhumalai, Chilika lake, Manas]
- Practical: 15 To study endemic amphibian and reptilian species of India
[Indian bull frog, tree frog, Gharial, Star tortoise]

Practical: 16 To study endemic avian species of India
[Paradise Fly cather, Bee eater, Flamingo, Great Indian Bustard]

Practical: 17 To study endemic mammalian species of India
[Chital, Barasingha, Hangul deer, Lion tailed macaque]

Unit-4 Biotechnology

Practical: 18 To study preparation of culture of E.coli

Practical: 19 To study Vectors by chart

Practical: 20 To study PCR technique (through chart/demonstration)

Practical: 21 To study rDNA technology

Practical: 22 To study microorganism by slide preparation (Yeast & Bacteria)

Unit-5 Toxicology

Practical: 23 To study effect of Arsenic on human body (Chart/Photographs)

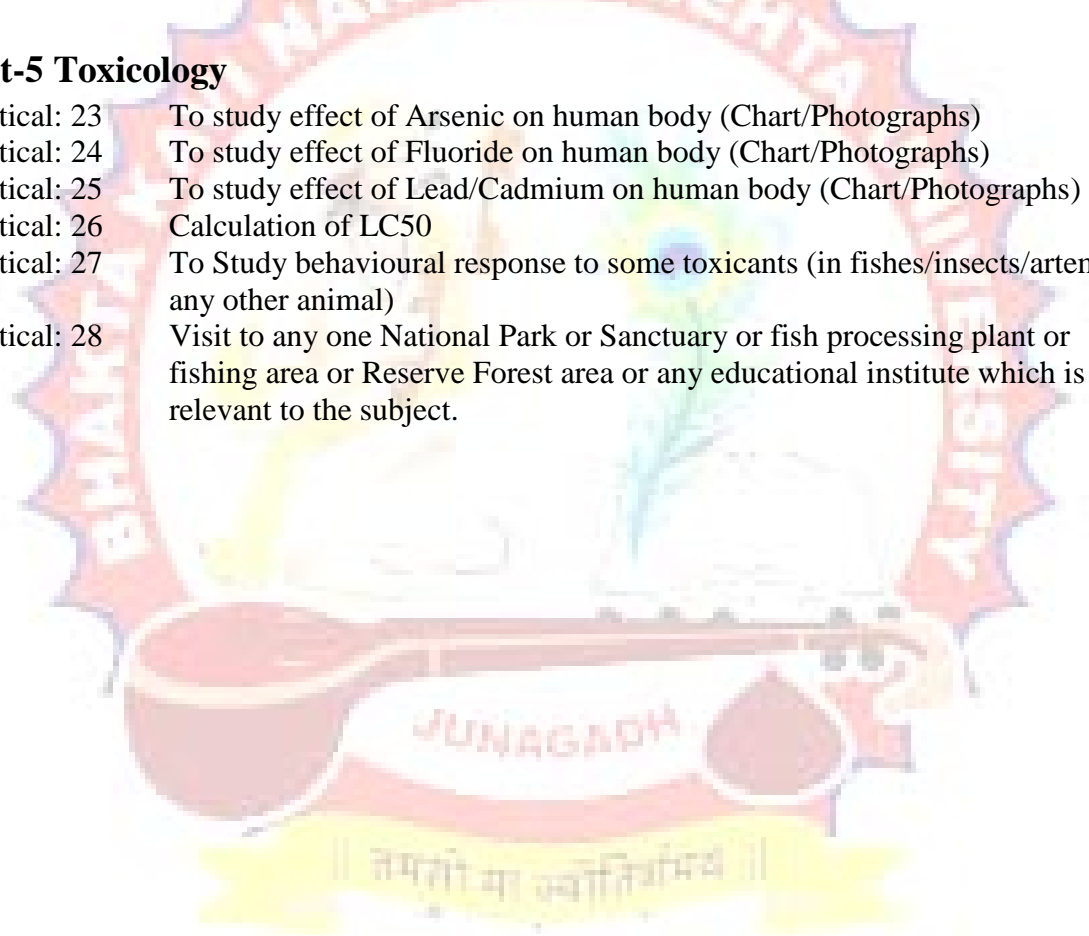
Practical: 24 To study effect of Fluoride on human body (Chart/Photographs)

Practical: 25 To study effect of Lead/Cadmium on human body (Chart/Photographs)

Practical: 26 Calculation of LC50

Practical: 27 To Study behavioural response to some toxicants (in fishes/insects/artemia/
any other animal)

Practical: 28 Visit to any one National Park or Sanctuary or fish processing plant or
fishing area or Reserve Forest area or any educational institute which is
relevant to the subject.



A LIST OF REFERENCES BOOKS FOR PAPER-502

1. Fish & Fisheries of India ---V.G.Jhingram
2. Fishes an introduction to Ichthyology ---Paper and Moyle
3. Hand book of tropical aquarium fishes ---HerberR.Axclrod
4. Marine fisheries ---D.V.Bal ,K.V.Rao
5. Ichthyology ---S.Chand
6. Text book of applied entomology --Srivastava
7. Economic zoology --Shukla &Upadhyaya
8. Pest management & Pesticides Indian scenario --Nyar B.V.
9. Wild life of Gujarat --H.S.Sing
10. Natural inheritance in Gujarat --H.S.Sing
11. Poultry science --MihirSuthar
12. Elements of Bio-technology --P.K.Gupta
13. Molecular Biology & Biotechnology --R.A.Meyers
14. Biotechnology --KeshavTrehan
15. Fundamentals of computers --V.Rajaraman
16. Fish & Fisheries --Pandey & Shukla



DISTRIBUTION OF UNITS

SEMESTER – V

PAPER – Z-502			
Unit No.	Unit Title	Theory Period	Marks
Unit : 1	Fisheries Biology	14	14
Unit : 2	Animal Husbandry	14	14
Unit : 3	Wildlife	12	14
Unit : 4	Biotechnology	15	14
Unit : 5	Toxicology	17	14
TOTAL :		72	70

BHAKTA KAVI NARSINH MEHTA UNIVERSITY, JUNAGADH

THEORY EXAMINATION PAPER STYLE

SEMESTER – V

ZOOLOGY

(Based on Paper – Z-502)

Time: 2½ Hours

Total Marks: 70

Instructions:

1. Illustrate your answer with neat and labeled diagrams.
2. Figure to the right side indicates full marks of questions.
- ANY TYPE OF MCQs IS NOT INCLUDED IN THIS PAPER STYLE.
- EACH QUESTION CARRIES EQUAL MARKS – 14.
- THERE ARE 5 QUESTIONS CONTAINING SUBQUESTIONS (A), (B), (C).

QUESTION-1: (From UNIT-1) [14]

(A) Answer the following question (write any one out of two) (07)

(1)

(2)

(B) Answer the following question (write any one out of two) (04)

(1)

(2)

(C) Answer the following question (write any three out of five) (03)

(1)

(2)

(3)

(4)

(5)

QUESTION-2: (As Above) (From UNIT-2) [14]

QUESTION-3: (As Above) (From UNIT-3) [14]

QUESTION-4: (As Above) (From UNIT-4) [14]

QUESTION-5: (As Above) (From UNIT-5) [14]

BHAKTA KAVI NARSINH MEHTA UNIVERSITY, JUNAGADH

B.Sc. Semester – V
Skeleton for Practical Examination
Practical Paper No. 2 Based on Paper—Z 502

Time : 3 Hrs

Total- 35 Marks

Que:1 Write as per instruction. (22)

1. Identify and classify giving reason (Practical-1 & 2)
2. Identify and describe (Practical- 5 & 6)
3. Identify and give its economic importance (Practical-3)
4. Identify and give its economic importance (Practical-7, 8 & 9)
5. Identify and describe (Practical-10 & 12)
6. Identify and describe (Practical-13 &14)
7. Identify and describe (Practical-15, 16 & 17)
8. Identify and describe (Practical-18 & 19)
9. Identify and describe technique (Practical- 20 & 21)
10. Identify and describe its effect (Practical-23, 24 & 25)
11. Describe as mentioned (Practical-26 & 27)

Que:2 Make a temporary slide of microorganism (Practical-22) (03)

Or

Do as per instruction. (Practical-11)

Or

Calculate age of fish from given scale. (Practical-4)

Que:3 Report of study tour (05)

Que:4 Viva-voce (02)

Que:5 Certified Journal (03)

BHAKTA KAVI NARSINH MEHTA UNIVERSITY, JUNAGADH
(CBCS Syllabus)
SEMESTER – V
ZOOLOGY
PAPER – Z-503

Functional Anatomy of Chordates, Systematic, Forms & Functions and Comparative Anatomy

UNIT- 1: SYSTEMATIC

- Salient features and classification up to order from Protochordata up to class mammals with examples

UNIT- 2: FORMS AND FUNCTIONS IN ANIMALS

- General structure and morphology with functional anatomy of following animals.
 - PISCES: Scoliodon: Systematic position, Distribution, habits and habitat, External characters, Digestive system, Respiratory system, Blood Vascular system: heart and Arterial system, Urinogenital system and reproduction, Brain, Cranial nerves, Sense organs: Lateral line system, Internal ear and Ampulla of Lorenzini, Placoid scales, Economic importance
 - AVES: Pigeon – Systematic position, habits and habitat, External characters, Exoskeleton, Feathers, Flight muscles, Digestive system, Respiratory system, Blood Vascular system: heart, Arterial system and venous system, Urinogenital system and reproduction, Brain, Sense organs: Pecten

UNIT- 3: LOWER VERTEBRATES

- PISCES: General organization and affinities of Dipnoi, Air bladder in Fishes, Types of caudal fins, parental care in fishes
- AMPHIBIA: Neoteny, Parental care in Amphibia, Origin and Ancestry of Amphibia and Economic importance of Amphibia

UNIT- 4: HIGHER VERTEBRATES

- Reptilia: Origin of Reptiles, Evolution and Adaptive Radiation (in detail), Sphenodon as a living Fossil, Temporal Fossae
- AVES: Flight Adaptation, modes of Flight, Difference between Ratitae and Carinatae, Types of beak, Types of Claw, Types of Feathers, Migration in birds, Archaeopteryx and its significance

- Mammals: Egg laying mammals, pouched mammals, aquatic mammals, Dentition in mammals

UNIT-5: COMPARATIVE ANATOMY

- Comparative account of digestive system in vertebrates: Embryonic digestive tract, Alimentary canal: Parts, Derivatives and Digestive glands
- Comparative account of kidney in vertebrates: Structure, origin, Archinephrous, Pronephrous, Mesonephrous and Metanephrous
- Comparative account of Brain in vertebrates: Pisces, Amphibia, Reptilia, Aves and Mammals



Practical No. 3

LIST OF PRACTICALS BASED ON THEORY PAPER – Z-503

UNIT- 1: SYSTEMATIC

- Practical: 1 To study classification of sub phylum Urochordata upto super class Pisces.
[Ciona, Botryllus, Pyrosoma, Doliolum, Salpa, Oikopleura, Amphioxus, Bdellostoma, Guitar Fish, Hammer headed shark, Skate, Chimaera, Latimeria, Neoceratodus, Polypterus, Amia, Lepidosteus, Catla, Exocoetus, Syngnathus, Clarius, Ophiocephalus, Echeneis, Porcupine fish, Lophius]
- Practical: 2 To study classification of class Amphibia upto class Reptilia.
[Uraeotyphlus, Ambystoma, Triturus, Necturus, Amphiuma, Proteus, Bombinator, Xenopus, Chelone, Alligator, House, Wall lizard, Gila monster, Blind snake, Sand boa, King cobra, Krait, Russel's viper, Echis carinata, Hydrophis]
- Practical: 3 To study classification of class Aves upto class Mammalia.
[Emu, Kiwi, House Sparrow, Peacock, Hoopoe, Cattle egret, King vulture, Humming bird, Ornithorhynchus, Koala, Mole, Armadillo, Pangolin, Lemus, Chimpanzee, Rat, Rabbit, Blue whale, Mongoose, Hippopotamus]

UNIT- 2: FORMS AND FUNCTIONS IN ANIMALS

- Practical: 4 To study external characters, Digestive system, Arterial, Urinogenital system and Brain of Scoliodon.
- Practical: 5 To study mountings of placoid scales, Ampula of Lorenzini and internal ear.
- Practical: 6 To study external characters, Digestive system, Arterial system, Venous system, Urinogenital system and brain of Pigeon.
- Practical: 7 To study Feathers of Pigeon.
- Practical: 8 To study mounting of pecten.

UNIT- 3: LOWER VERTEBRATES

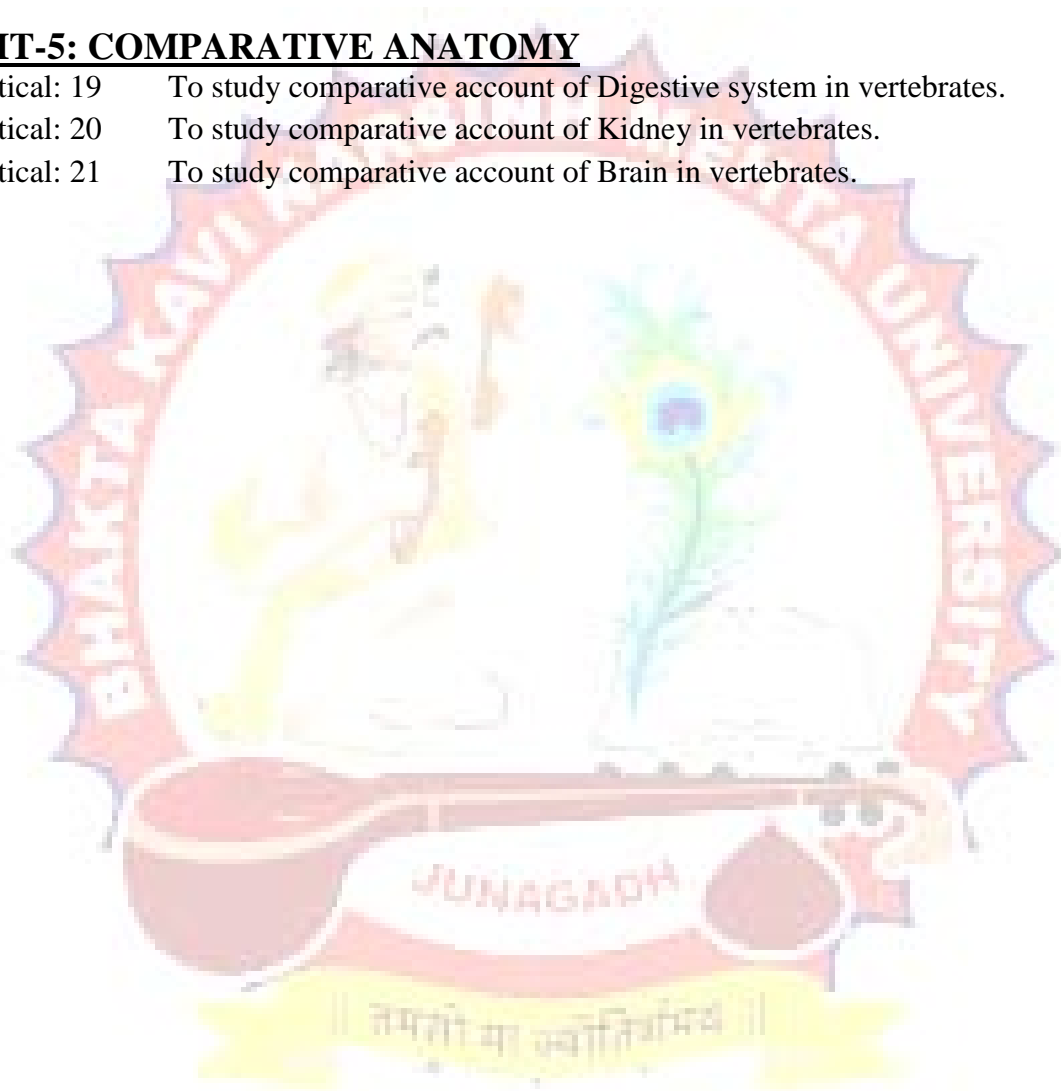
- Practical: 9 To study caudal fins in fishes.
- Practical: 10 To study parental care in fishes.
[Male Stickle back, Protopterus, Tilapia, Lepidosiren, Amia, Kurtus, Hippocampus, Scyllium and Scoliodon]
- Practical: 11 To study paedogenesis in Amphibia.
- Practical: 12 To study parental care in Amphibia.
[Ichthyophis, Alytes, Pipa, Nototrema, Rhinoderma, Rhacophorus, Hyla]

UNIT- 4: HIGHER VERTEBRATES

- Practical: 13 To study sphenodon as living fossil.
Practical: 14 To study temporal fossae in Reptiles.
Practical: 15 To study types of beaks in Birds.
Practical: 16 To study types of claws in Birds.
Practical: 17 To study Archaeopteryx and its significance.
Practical: 18 To study dentition in mammals.(Pig, Horse, Dog, Bat,Goat)

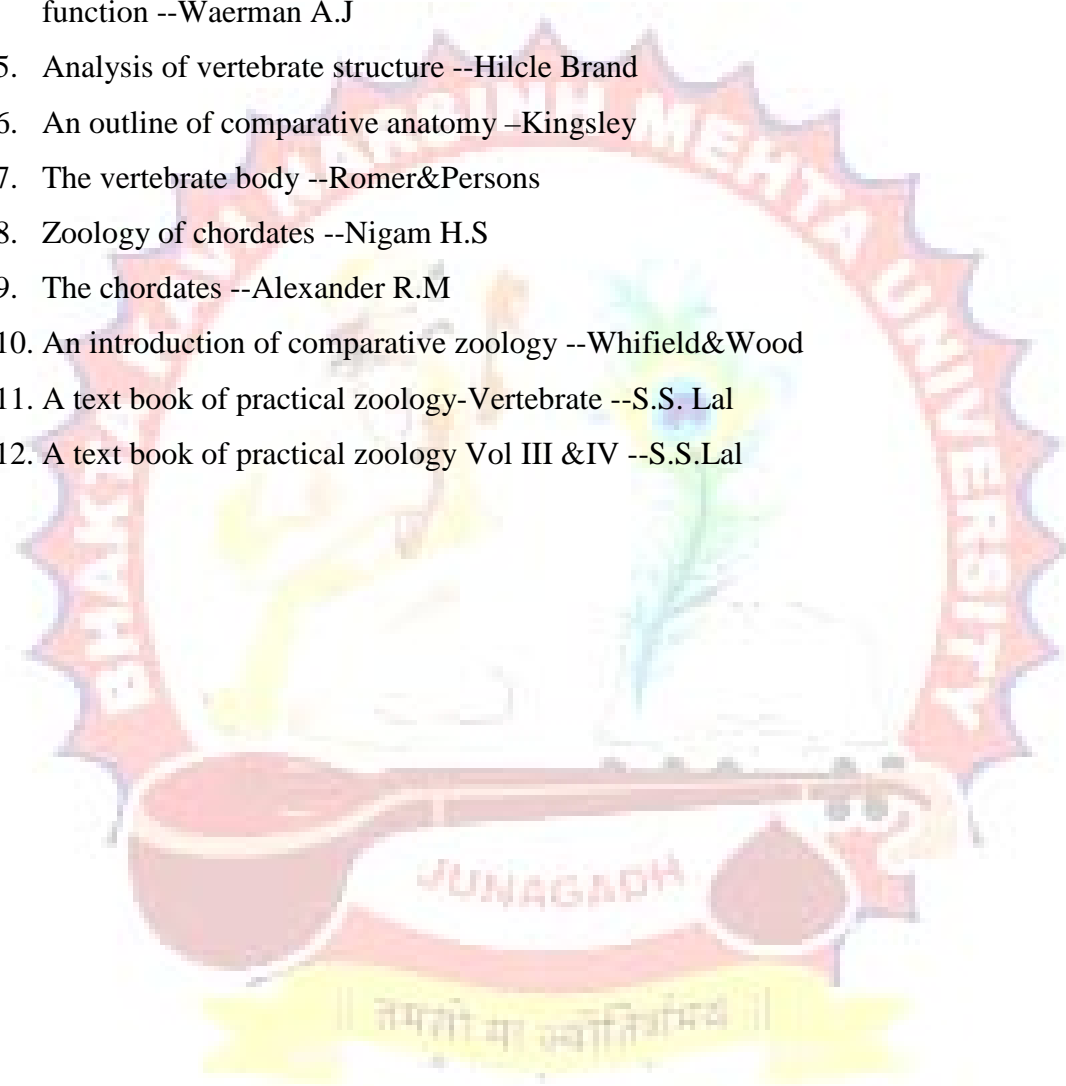
UNIT-5: COMPARATIVE ANATOMY

- Practical: 19 To study comparative account of Digestive system in vertebrates.
Practical: 20 To study comparative account of Kidney in vertebrates.
Practical: 21 To study comparative account of Brain in vertebrates.



A LIST OF REFERENCES BOOKS FOR PAPER-503

1. Vertebrate Zoology --R.L.Kotpal
2. Vertebrate Zoology --E.L. Jordan
3. Vertebrate Zoology --Dr. S.N. Prasad
4. A student text book of zoology vol.1&2 --Adan Sedwick • Chordate structure and function --Waerman A.J
5. Analysis of vertebrate structure --Hilcle Brand
6. An outline of comparative anatomy --Kingsley
7. The vertebrate body --Romer&Persons
8. Zoology of chordates --Nigam H.S
9. The chordates --Alexander R.M
10. An introduction of comparative zoology --Whifield&Wood
11. A text book of practical zoology-Vertebrate --S.S. Lal
12. A text book of practical zoology Vol III &IV --S.S.Lal



DISTRIBUTION OF UNITS

SEMESTER – V

PAPER – Z-503

Unit No.	Unit Title	Theory Period	Marks
Unit : 1	Systematic	14	14
Unit : 2	Forms and functions in animals	16	14
Unit : 3	Lower vertebrates	14	14
Unit : 4	Higher vertebrates	14	14
Unit : 5	Comparative anatomy	14	14
TOTAL :		72	70

BHAKTA KAVI NARSINH MEHTA UNIVERSITY, JUNAGADH

THEORY EXAMINATION PAPER STYLE

SEMESTER – V

ZOOLOGY

(Based on Paper – Z-503)

Time: 2½ Hours

Total Marks: 70

Instructions:

1. Illustrate your answer with neat and labeled diagrams.
2. Figure to the right side indicates full marks of questions.
- ANY TYPE OF MCQs IS NOT INCLUDED IN THIS PAPER STYLE.
- EACH QUESTION CARRIES EQUAL MARKS – 14.
- THERE ARE 5 QUESTIONS CONTAINING SUBQUESTIONS (A), (B), (C).

QUESTION-1: (From UNIT-1) [14]

(A) Answer the following question (write any one out of two) (07)

(1)

(2)

(B) Answer the following question (write any one out of two) (04)

(1)

(2)

(C) Answer the following question (write any three out of five) (03)

(1)

(2)

(3)

(4)

(5)

QUESTION-2: (As Above) (From UNIT-2) [14]

QUESTION-3: (As Above) (From UNIT-3) [14]

QUESTION-4: (As Above) (From UNIT-4) [14]

QUESTION-5: (As Above) (From UNIT-5) [14]

BHAKTA KAVI NARSINH MEHTA UNIVERSITY, JUNAGADH

B.Sc. Semester – V
Skeleton for Practical Examination
Practical Paper No. 3 Based on Paper—Z 503

Time : 3 Hrs

Total- 35 Marks

- Que:1 Sketch and label _____ system of _____ and show it to examiner. (Practical 4 & 6) (07)
- Que:2 Sketch and label _____ of _____ and show it to examiner. (Practical 5,7 & 8) (03)
- Que:3 Identify and Describe as per given comparative account of vertebrates. (Practical 19,20 & 21) (04)
- Que:4 Identify and Describe as per specific characters of specimen. (Practical 11,13 & 17) (03)
- Que:5 Write as per given instruction (14)
- (1) Identify and classify giving reasons. (Practical 1)
 - (2) Identify and classify giving reasons. (Practical 2)
 - (3) Identify and classify giving reasons. (practical 3)
 - (4) Identify and describe (Practical 9, 14)
 - (5) Identify and describe (Practical 10, 12)
 - (6) Identify and describe (Practical 15, 16)
 - (7) Identify and describe (Practical 18)
- Que:5 Viva-voce (02)
- Que:6 Certified Journal (02)

BHAKTA KAVI NARSINH MEHTA
UNIVERSITY, JUNAGADH



FACULTY OF SCIENCE

[Three Years (6 Semesters) Full Time Course]

ZOOLOGY SYLLABUS

2020 - 21

Bhakta Kavi Narsinh Mehta University
Junagadh – 362 001
Gujarat, India

Website: www.bknmu.edu.in

BHAKTA KAVI NARSINH MEHTA
UNIVERSITY, JUNAGADH



ZOOLOGY
SYLLABUS

[SYLLABUS FOR THE CHOICE BASED CREDIT SYSTEM (CBCS)]

(T.Y. B.Sc.)

**SEMESTER VI – PAPER – Z-601,
602, 603**

New Syllabus

INFORCE FROM JUNE – 2020

FORWARD

In academics, syllabus serves as a roadmap for teaching various topics in a well defined manner. Along with constant changes in the field of subject, it is always required to review and update the syllabus so as to meet changing scenario at regional, national and global levels. In science, higher education at degree level creates base for students to sharpen their skills and enable them for securing employment. Moreover, for a few this also opens a new realm of research and education at post graduation level. Hence, finalizing degree level syllabus requires to keep all these facts in mind.

Here, the current syllabus is finalized after elaborate discussions amongst well qualified and experienced teachers. The syllabus is in line with the syllabi of previous semesters providing seamless learning experience to the students. The present syllabus encompasses latest trends in the subject and is also in tune with UGC's guideline. We are hopeful that students will be able to enhance their knowledge and understating of the subject well.

Board of Studies, Zoology
Bhakta Kavi Narsinh Mehta University,
Junagadh – 362 001

BHAKTA KAVI NARSINH MEHTA UNIVERSITY, JUNAGADH
(CBCS Syllabus)
SEMESTER – VI
ZOOLOGY
PAPER – Z-601

Biochemistry, Cytology, Instrumentation Biology, Genetics, Fundamental Processes

UNIT – 1: BIOCHEMISTRY - I

1.1 CARBOHYDRATE:

- Definition, General formula, Structural properties, classification and structure of carbohydrate
- Monosaccharide: Definition, General formula, classification up to Hexoses (with structures of suitable examples)
- Disaccharides: Definition, General formula and classification
Occurrence, formation, structure and general properties of maltose, lactose, sucrose
- Polysaccharides: Definition, classification based on structure and functions
- Occurrence, formation, Structure and general properties of
 1. Homopolysachharide – Starch, Glycogen, Cellulose
 2. Heteropolysachharide: Muccopolysachharides- Hyaluronic acid, Chondroitin sulphate
- Biological significance of carbohydrates

1.2 LIPID:

- Introduction and Definition
- Components: (a) Alcohols (b) Fatty acids
- Classification of lipid: (a) Simple (b) Compound (c) Derived lipid
- Biological significance of lipids

1.3 METABOLISM:

- Glycolysis, Glyconeogenesis, Glycerol Metabolism, Fatty acid Metabolism (β – oxidation of saturated fatty acid)

UNIT – 2: BIOCHEMISTRY - II

2.1 PROTEIN:

- Introduction and Definition
- Amino acids: General formula , Classification based on the composition of the side chain
- Protein configuration: Primary, secondary, Tertiary, Quaternary structure
- Classification of Protein:

- (a) Based on shape – Globular and Fibrillar
- (b) Based on composition and solubility – simple, conjugated and Derived
- Biological significance of protein
- Protein metabolism: Urea cycle

2.2 ENZYME:

- Introduction, Definition and chemical nature
- Nomenclature and classification
- Factors affecting enzyme activity/ enzyme catalyzed reaction (Temperature, pH, Enzyme concentration, substrate concentration)
- Inhibitors (Reversible, Irreversible, Allosteric)

UNIT – 3: CYTOLOGY

3.1 CYTOSKELTON:

- Introduction
- Structure and Function
- Organization
- Cytoskeleton Filaments: Microfilaments, Intermediate Filaments, Microtubules

3.2 CELL CYCLE:

- Mitosis, Meiosis (stages and significance of its)

3.3 CANCER:

- Introduction
- Types of cancer
- Characteristics of cancerous cells
- Oncogenes

3.4 TOOLS AND TECHNIQUES

- Electrophoresis
- Paper chromatography: Ascending and Descending

UNIT – 4: GENETICS

4.1 - Types of DNA: A – DNA, B- DNA, Z- DNA

- Types of RNA: mRNA, tRNA, rRNA and snRNA
- Molecular genetics: Concept of gene, Molecular structure of gene
- Ultrastructure and general functions of metaphase chromosome (Chromatin, Chromatids, Nucleosome, Centromere, Kinetochore, Telomere, Secondary constriction, Euchromatin, Heterochromatin)

4.2 – Chromosomal aberration (Numerical and structural)

- Mutagenic agents

4.3 - Prenatal sexes and diagnosis (amniocentesis)

- Human hereditary traits: Pedigree analysis, Colour blindness, Haemophilia, Ear pinna.

UNIT – 5: FUNDAMENTAL PROCESSES AND TECHNIQUES

5.1 DNA REPLICATION: Modes of DNA replication and Process of DNA Replication

5.2 PROTEIN SYNTHESIS: Transcription and Translation

5.3 Southern Blotting Technique

5.4 Northern Blotting Technique

5.5 Polymerase Chain Reaction (PCR)

Practical No. 1

LIST OF PRACTICALS BASED ON THEORY PAPER – Z-601

UNIT: 1 Biochemistry – I AND II

- Practical: 1 : Detection of glucose.
Practical: 2 : Detection of maltose.
Practical: 3 : Detection of starch.
Practical: 4 : Detection of protein from milk.
Practical: 5 : Detection of protein from egg.
Practical: 6 : Detection of lipid.
Practical: 7 : Preparation of the atomic model - **Carbohydrates** – Glucose, Fructose, Maltose, Lactose, Sucrose, Fructose, Galactose

UNIT: 3 Cytology

- Practical: 8 : Detection of amino acid by paper chromatography.
Practical: 9 : To study agarose gel electrophoresis.
Practical: 10 : Temporary preparation of mitosis cell – division from onion root tip.
Practical: 11 : Temporary preparation of meiosis cell – division from Tradenschantia.

UNIT :4 Genetics

- Practical: 12 : Temporary preparation of Barr body.
Practical: 13 : To study of giant chromosome from mounting of salivary gland of chironomous larva / Drososphilla.
Practical: 14 : To study of permanent slide of cell – differentiation.
Practical: 15 : To study a transmission of autosomal recessive trait (e.g, Thalasemia)
Practical: 16 : To study transmission of sex – linked chromosome trait (e.g., Red – green colour blindness)
Practical: 17 : To study transmission of Y – linked dominant trait
Practical: 18 : To study of karyotype of – Normal male, Normal female, Down syndrome, Klinefelter syndrome, Turner syndrome.

UNIT: 5 Fundamental Processes And Techniques

- Practical: 19 : To study process of DNA replication by chart.
Practical: 20 : To study process of transcription by chart.
Practical: 21 : To study process of translation by chart.

A LIST OF REFERENCES BOOKS FOR PAPER-601

1. Biochemistry ----Das Gupta S.K
2. Biochemistry ---Stryer.L.
3. Out line Biochemistry ---Conn.et.al
4. Molecular biology of the cell ---Alberts et.al
5. Molecular boiology ----Arumajan
6. Cell in development & Inheritance ---Wilson E.B.
7. Principle of Biochemisry ---Lehninger
8. Cell molecular biology ---De Roberties & De Roberties
9. GeneVII ----Lewin
10. Cytology ----Veerbala Rastogi
11. Cytology ---Agarwal
12. Genetics ---Meyyer & Anderson
13. Genetics ---Edger Altenburg
14. Cytology, Genetics & Evolution ---P.K.Gupta
- 15. Genetics ---Strick berger**

DISTRIBUTION OF UNITS

SEMESTER – VI

PAPER – Z-601

Unit No.	Unit Title	Theory Period	Marks
Unit : 1	Biochemistry – I	15	14
Unit : 2	Biochemistry – II	15	14
Unit : 3	Cytology	14	14
Unit : 4	Genetics	14	14
Unit : 5	Fundamental processes and techniques	14	14
TOTAL :		72	70

BHAKTA KAVI NARSINH MEHTA UNIVERSITY, JUNAGADH

THEORY EXAMINATION PAPER STYLE

SEMESTER – VI

ZOOLOGY

(Based on Paper – Z-601)

Time: 2½ Hours

Total Marks: 70

Instructions:

1. Illustrate your answer with neat and labeled diagrams.
 2. Figure to the right side indicates full marks of questions.
- ANY TYPE OF MCQs IS NOT INCLUDED IN THIS PAPER STYLE.
 - EACH QUESTION CARRIES EQUAL MARKS – 14.
 - THERE ARE 5 QUESTIONS CONTAINING SUBQUESTIONS (A), (B), (C).

QUESTION-1: (From UNIT-1) [14]

(A) Answer the following question (write any one out of two) (07)

(1)

(2)

(B) Answer the following question (write any one out of two) (04)

(1)

(2)

(C) Answer the following question (write any three out of five) (03)

(1)

(2)

(3)

(4)

(5)

QUESTION-2: (As Above) (From UNIT-2) [14]

QUESTION-3: (As Above) (From UNIT-3) [14]

QUESTION-4: (As Above) (From UNIT-4) [14]

QUESTION-5: (As Above) (From UNIT-5) [14]

BHAKTA KAVI NARSINH MEHTA UNIVERSITY, JUNAGADH

B.Sc. Semester – VI
Skeleton for Practical Examination
Practical Paper No. 1 Based on Paper—Z 601

Time : 3 Hrs

Total- 35 Marks

- Que: 1 Detect the components with biochemical test from the given sample. Write each step in answer book, show it to the examiner.
(Practical 1 to 6) (06)
- Que: 2 Prepare the atomic model and Draw in answer book, show it to examiner. (Practical 7) (02)
- Que: 3 Perform the practical as per instruction and write in answer book, show it to examiner. (Practical 8 and 9) (06)
- Que: 4 Make a temporary stain preparation of _____ as per examiner instruction. (Practical 10 to 12) (06)
- Que: 5 Write as per given instruction (10)
- (1) Identify and describe (Practical 13 and 14)
 - (2) Identify and describe (Practical 15 to 17)
 - (3) Identify and describe (practical 18)
 - (4) Identify and describe (Practical 19 to 20)
 - (5) Identify and describe (Practical 21)
- Que: 6 Viva-voce (02)
- Que: 7 Certified Journal (03)

BHAKTA KAVI NARSINH MEHTA UNIVERSITY, JUNAGADH
(CBCS Syllabus)
SEMESTER – VI
ZOOLOGY
PAPER – Z-602

Animal Physiology, Immunology, Sense Organs and Histology

UNIT-1: CARDIOVASCULAR SYSTEM

- Structure of heart, origin of heart, double circulation, conduction system, regulation of heart beat, cardiac cycle & cardiac output and E.C.G.
- Blood pressure: Types of blood pressure, abnormalities related to blood pressure
- Physiology of blood coagulation: Hemostasis, blood clotting, intrinsic, extrinsic & common pathway & clotting factors
- Diseases related to circulatory system: Artherosclerosis, Coronary Artery Disease, Congenital Defects, Arrhythmias, Heart Block

UNIT-2: RESPIRATORY SYSTEM

- Structure of respiratory system
- Pulmonary ventilation (Process of breathing & Boyle's law)
- Exchange of Gases: External respiration, Internal respiration, Dalton's law, Henry's law.
- Transport of Gases: Transport of Oxygen, Oxygen dissociation curve, Abnormalities in oxygen transport, Transport of Carbon dioxide:- bohr effect, haldone effect, CO poisoning
- Control of Respiration:- Respiratory centers, regulation of respiratory centers
- Respiratory pigments: Haemoglobin, Haemocyanin, Chlorocruorin, Haemerythrin, Pinnaglobin, Vanadium, Molpadin, Echinochrome

UNIT-3: NERVOUS SYSTEM, MUSCULAR SYSTEM & ENDOCRINOLOGY

- Structure of neuron, types of neurons, conduction of nerve impulse, types of nervous system
- Types of muscles:- skeletal, smooth & cardiac muscles, physiology of muscle contraction
- Endocrinology:- types of hormones, mechanism of hormones action, structure & function of various endocrine glands (Pituitary, Thyroid, Parathyroid, Thymus, Adrenal, Testis, Ovary, Pancreas and GI track) and their hormones

UNIT-4: LYMPHATIC SYSTEM & IMMUNOLOGY & RECEPTORS

- Lymphatic organs & tissues
- Immunoglobulin structure & Immunoglobulin classes.
- Types of Immunity: Innate immunity, Adaptive immunity, Cell mediated immunity, Antibody mediated immunity
- Receptors: Gustato, Phono, Photo, Touch corpuscles, Olfactory receptors

UNIT-5: HISTOLOGY

- Microtomy: Introduction to Microtomy, types of Microtomes & their applications
- Techniques in Histology:- Tissue fixation, types of fixative & stains, process of dehydration & rehydration, single staining & double staining methods
- Histological structure:- Thymus, Lymph nodes, Spleen, Bone & cartilage tissue, Tongue, Skin, Skeletal muscle, Eye, Olfactory epithelium



Practical No. 2

LIST OF PRACTICALS BASED ON PAPER – Z-602

Unit: 1 and Unit: 2 Physiology

- Practical: 1 : Red blood corpuscles (Erythrocytes) count
- Practical: 2 : White blood cell (Leucocytes) count
- Practical: 3 : Haemoglobin estimation
- Practical: 4 : To check the blood pressure
- Practical: 5 : Counting of pulse rate at rest and after exercise
- Practical: 6 : Preparation of Haemin crystals
- Practical: 7 : Estimation blood clotting time by capillary method

Unit: 3 Endocrinology, Nervous and Muscular System

- Practical: 8 : To study structure and function of various endocrine glands (Pituitary, Adrenal, Pancreas, Thyroid, Ovary and Testis).
- Practical: 9 : To study structure of skeletal muscle through permanent slide.
- Practical: 10 : To study various types of neurons through permanent slide.

Unit: 5 Histology

- Practical: 11 : To study structure of microtome and process of microtomy.
- Practical: 12 : To study histological structure and function of following structures through permanent slides: Thymus, Lymph nodes, Spleen, Bone & cartilage tissue, Tongue, Skin, Skeletal muscle, Eye, Olfactory epithelium.
- Practical: 13 : To study various kinds of fixatives (one each made in alcohol, acetic acid and aqueous Bouin's fluid, Carnoy's fluid)
- Practical: 14 : To study various kinds of stains (Eosin, Haemotoxylin, Methyl blue, Acetocarmine)
- Practical: 15 : A process of making permanent histological slide by single staining technique
- Practical: 16 : A process of making permanent histological slide by double staining technique
- Practical: 17 : To study micro techniques and preparation of tissue for microtomy
 - (i) Collection of tissue and fixation
 - (ii) Washing in running tap water
 - (iii) Dehydration
 - (iv) Dealcoholization (clearing)
- Practical: 18 : To study micro techniques and preparation of permanent histological slides
 - (i) Embedding
 - (ii) Block preparation
 - (iii) Sectoning
 - (iv) Staining and mounting
 - (v) Identification and naming of slides

A LIST OF REFERENCES BOOKS FOR PAPER-602

1. Animal physiology –Eckert
2. Essential of animal physiology --S.C.Rastogi
3. Element of animal physiology --R.Nagabhushanam
4. General and comparative physiology –Hoar
5. Human physiology –Cheterji
6. Principal of animal physiology --Wood D.W.
7. Physiology of anatomy and physiology –Tortora & Tortora
8. Comparative animal physiology --Prosser C.L.
9. Text book of Baley's Histology --Copenharver bunga&burge
10. Endocrinology –Hadley
11. Hand book of experimental physiology&biochemistry --Dr.P Vijay Chandha
12. Animal Physiology --Richard W. Hill
13. A text-book of the principles of animal histology. -- Ulrie Dahlgren
14. Practical Haematology -- Dacie and Lewis
15. Animal physiology --Shastri&Gohil

DISTRIBUTION OF UNITS

SEMESTER – VI

PAPER – Z-602

Unit No.	Unit Title	Theory Period	Marks
Unit : 1	CARDIOVASCULAR SYSTEM	14	14
Unit : 2	RESPIRATORY SYSTEM	14	14
Unit : 3	NERVOUS SYSTEM, MUSCULAR SYSTEM & ENDOCRINOLOGY	15	14
Unit : 4	LYMPHATIC SYSTEM & IMMUNOLOGY & RECEPTORS	15	14
Unit : 5	HISTOLOGY	14	14
TOTAL :		72	70

BHAKTA KAVI NARSINH MEHTA UNIVERSITY, JUNAGADH

THEORY EXAMINATION PAPER STYLE

SEMESTER – VI

ZOOLOGY

(Based on Paper – Z-602)

Time: 2½ Hours

Total Marks: 70

Instructions:

1. Illustrate your answer with neat and labeled diagrams.
 2. Figure to the right side indicates full marks of questions.
- ANY TYPE OF MCQs IS NOT INCLUDED IN THIS PAPER STYLE.
 - EACH QUESTION CARRIES EQUAL MARKS – 14.
 - THERE ARE 5 QUESTIONS CONTAINING SUBQUESTIONS (A), (B), (C).

QUESTION-1: (From UNIT-1) [14]

(A) Answer the following question (write any one out of two) (07)

(1)

(2)

(B) Answer the following question (write any one out of two) (04)

(1)

(2)

(C) Answer the following question (write any three out of five) (03)

(1)

(2)

(3)

(4)

(5)

QUESTION-2: (As Above) (From UNIT-2) [14]

QUESTION-3: (As Above) (From UNIT-3) [14]

QUESTION-4: (As Above) (From UNIT-4) [14]

QUESTION-5: (As Above) (From UNIT-5) [14]

BHAKTA KAVI NARSINH MEHTA UNIVERSITY, JUNAGADH

B.Sc. Semester – VI
Skeleton for Practical Examination
Practical Paper No. 2 Based on Paper—Z 602

Time : 3 Hrs

Total- 35 Marks

- Que:1 Make a permanent slide from the given histological material with staining technique and show it to examiner.
(Practical 15 and 16) (06)
- Que:2 Set up _____ experiment and write in answer book. (08)
(Practical 1, 2, 3, 6 and 7)
- Que:3 Check the blood pressure/Counting of pulse rate (04)
(Practical 4 and 5)
- Que:4 Write as per given instruction (08)
(1) Identify and comment on histological structure (Practical. 12)
(2) Identify and comment on functional activities or write a detail formula with proper effect (Practical 13 and 14)
(3) Identify and describe (Practical 8)
(4) Identify and describe (Practical 9, 10, 11)
- Ques:5 Submission of permanent slide (05)
- Que:6 Viva-voce (02)
- Que:7 Certified Journal (02)

BHAKTA KAVI NARSINH MEHTA UNIVERSITY, JUNAGADH
(CBCS Syllabus)
SEMESTER – VI
ZOOLOGY
PAPER – Z-603

Embryology, Evolution, Biostatistics, Environmental pollution, Animal Behaviour and Ecology

UNIT-1: EMBRYOLOGY

- Parthenogenesis in general:
 - Parthenogenesis, Types, Natural Parthenogenesis, Artificial Parthenogenesis and its significance
- Embryology of Chick
 - Structure of egg, fertilization, cleavage, blastulation, gastrulation
 - Development and role of Primitive streak
 - Salient features of 18hour, 24 hour, 33 hour, 48 hour & 72 hour chick embryo
 - Extra embryonic membranes in chick
- Types and function of Placenta in mammals
- Regeneration
 - Definition, types of regeneration, Regeneration in Hydra and Salamander

UNIT-2: EVOLUTION AND BIOSTATISTICS

- Geological Time Scale
- Zoo-geography
 - Zoo-geographical realms
 - Life on Islands
 - Volesia/Wallacea
- Macro and micro evolution (Gene pool, Gene flow and Genetic Drift)
- Basics of Biostatistics
 - Sampling
 - Central tendency
 - Standard deviation
 - Correlation and Regression

UNIT-3: ENVIRONMENTAL POLLUTION

- Definition, Types, classification of pollution and its effects on humans (Air, water, soil pollution)
- Major anthropogenic global environmental problems:
 - Acid rain
 - Green-house effect

- Ozone depletion
- Global Warming and Climate Change
- Waste disposal (Biodegradable and Non-degradable e.g., Plastic and E-Waste)

UNIT-4: ANIMAL BEHAVIOUR (ETHOLOGY)

- Learning: Definition, Types of learning: (a) Imprinting
(b) Habituation
(c) Classical conditioning
(d) Instrumental conditioning
- Reproductive behaviour patterns:
 - Courtship (Introduction, need of courtship)
 - Courtship signals e.g., Balloon fly
 - Persuasion & appeasement e.g., Stickleback & Herring gull's behavior
 - False information e.g., Scorpion fly
- Communication in/between Bats and Moths
- Social organization in baboons
- Pheromones

UNIT-5: ECOLOGY

- Population ecology
 - Definition, Basic concepts
 - Population characteristics – size, dispersion, age structure, natality, mortality, life tables
- Ecological Succession
 - Definition, Causes of succession
 - Types and process of succession
 - Hydrosere
 - Lithosere
 - Climax

Practical No. 3

LIST OF PRACTICALS BASED ON PAPER – Z-603

Unit 1 Embryology

- Practical: 1 : To study structure of egg, cleavage, blastulation and gastrulation.
Practical: 2 : A study of permanent slide of chick embryo (18, 24, 33, 48 & 72 hrs)
Practical: 3 : T.S. of chick embryo showing the development of neurulation (24, 33 hrs)
Practical: 4 : T.S. of chick embryo showing the development of heart (24, 33 hrs)
Practical: 5 : Mounting of chick embryo (Any 2 stage of embryonic development)
Practical: 6 : Study of eggs and tadpoles of frog from collected/ preservative materials

Unit 2 Evolution and Biostatistics

- Practical: 7 : Study of different zoo-geographical realms with the help of world map
Practical: 8 : Study of animals of oriental region (Cat fish, Rhacophorous, Salamender, Lizard, Snake, Turtle, Wood pecker, Rabbit, Squirrel, and Hedge-hog)
Practical: 9 : Examples of Hardy Weinberg law
Practical: 10 : Calculation regarding mean, median and SD from given data.
Practical: 11 : Study of Correlation and regression with the help of data provided.

Unit 3 Environmental pollution

- Practical: 12 : Estimation of total hardness
Practical: 13 : Estimation of O₂ from tap water
Practical: 14 : Estimation of O₂ from polluted water
Practical: 15 : Estimation of chlorinity and salinity from tap water
Practical: 16 : Estimation of chlorinity and salinity from polluted water
Practical: 17 : To study physical characteristics of soil texture, colour and temperature
Practical: 18 : To study Water holding capacity of soil

Unit 4 Animal Behaviour

- Practical: 19 : Study of Communication in/between bats & moths by charts
Practical: 20 : Study of Social organization in Baboons by charts
Practical: 21 : Study of Courtship signals in Balloon Fly (*Hilara sartor*), Persuasion & Appeasement in 3 Stickleback's zigzag dance and Herring gull, False information in Scorpion fly (*Hylobittacusapicalis*)
Practical: 22 : Study habituation behavior using mosquito larva.

A LIST OF REFERENCES BOOKS FOR PAPER-603

1. Reproductive Physiology ---Nalbandov A.V
2. Reproductive cycles ---Saidapur S.K.
3. General Endocrinology --- Bagnara & Turne
4. Introduction of Embryology --- Balansky, CBS College Publishers
5. A text book of Embryology --- Pattern
6. Chordate Embryology --- Verma& Others
7. An outline of Animal development ---Deven Port
8. Developmental Biology --- T. Subramanayam,
9. Developmental Biololgy --- Gilbert
10. Introduction of Evolution --- Moody
11. Evolution --- Savoge
12. Evolution --- Franklin Shull
13. Elements of Biostatistics --- Dr. Satguru Prasad, Rastogi Publications
14. Economic Zoology, Biostatistics and Animal Behaviour --- G. S. Shukla, Rastogi Publications
15. Biostatistics --- P. Ramakrishnan, Saras Publications
16. Zoo Geography --- Darlington
17. A Text Book of Organic Evolution --- Mohan P. Arora & Himanshu Arora, Himalaya Publishing House
18. Organic Evolution --- N. Arumugam, Saras Publication
19. Environment Science --- Turk & Turk
20. Principle of Environment Biology --- P.K.G. Nair
21. Environmental Pollution (Popular Science), N. Manivasakan, National Book Trust, New Delhi
22. Ecology and Environment --- P. D. Sharma, Rastogi Publications, Meerut
23. Animal Behaviour --- Mohan P. Arora, Himalaya Publishing House
24. Essentials of Behaviour --- P. J. B. Slater, Cambridge Univ. Press
25. An Introduction to Animal Behaviour --- Manning, Addition Wesley
26. Fundamental of Ecology --- P. S. Odum, Saunders
27. Concepts of Ecology --- N. Arumugam, Saras Publication, Nagercoil
28. Ecology --- Ricklefs, W. H. Freeman
29. Elements of Ecology ---Sharma & Mishra
30. Environmental studies --- S.V.S. Rana

DISTRIBUTION OF UNITS

SEMESTER – VI

PAPER – Z-603

Unit No.	Unit Title	Theory Period	Marks
Unit : 1	Embryology	15	14
Unit : 2	Evolution and Biostatistics	15	14
Unit : 3	Environmental pollution	10	14
Unit : 4	Animal Behaviour	16	14
Unit : 5	Ecology	16	14
TOTAL :		72	70

BHAKTA KAVI NARSINH MEHTA UNIVERSITY, JUNAGADH

THEORY EXAMINATION PAPER STYLE

SEMESTER – VI

ZOOLOGY

(Based on Paper – Z-603)

Time: 2½ Hours

Total Marks: 70

Instructions:

1. Illustrate your answer with neat and labeled diagrams.
 2. Figure to the right side indicates full marks of questions.
- ANY TYPE OF MCQs IS NOT INCLUDED IN THIS PAPER STYLE.
 - EACH QUESTION CARRIES EQUAL MARKS – 14.
 - THERE ARE 5 QUESTIONS CONTAINING SUBQUESTIONS (A), (B), (C).

QUESTION-1: (From UNIT-1) [14]

(A) Answer the following question (write any one out of two) (07)

(1)

(2)

(B) Answer the following question (write any one out of two) (04)

(1)

(2)

(C) Answer the following question (write any three out of five) (03)

(1)

(2)

(3)

(4)

(5)

QUESTION-2: (As Above) (From UNIT-2) [14]

QUESTION-3: (As Above) (From UNIT-3) [14]

QUESTION-4: (As Above) (From UNIT-4) [14]

QUESTION-5: (As Above) (From UNIT-5) [14]

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B.Sc. Semester – VI
Skeleton for Practical Examination
Practical Paper No. 3 Based on Paper—Z 603

Time : 3 Hrs

Total- 35 Marks

Que:1 Make a temporary embryo mounting from the given egg. Stain and identify the age of the embryo and show it to the examiner (07 marks)

Que: 2 Estimation of _____ from given sample. Write each step in answer book and show it to examiner (07 marks)

Que: 3 Check the _____ from the given sample. Write each step in answer book and show it to examiner (04 marks)

Que:4 Write as per given instructions (08 marks)

- (1) Identify and describe (Practical 1 to 4)
- (2) Identify and describe (Practical 7 to 8)
- (3) Identify and describe (Practical 9 to 11)
- (4) Identify and describe (Practical 19 to 21)

Que:5 Any five photographic presentation of animals (Description with academic value) (05 marks)

Que: 6 Viva voce (02 marks)

Que:7 Certified Journal (02 marks)