

**HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY PATAN - 384 265
NAAC'B' (CGPA) Accredited (State University)**

**UNDERGRADUATE PROGRAMME
CBCS :: Semester :: Grading Pattern
With effect from: June 2013 (In continuation)**

Faculty:Science

Subject:Zoology

SYLLABUS

SEMESTER – V & VI

Total Number of Pages: 1 to 32

**Submitted on
Date: / /2013**

Choice Based Credit System-Semester-Grading System In Under Graduate B.Sc. Programme

The 11th Five Year plan of India proposed various measures for academic reforms in higher education. To meet the challenges of the changing time and make the higher education in Indian Universities compatible with the universities in developed nations, the UGC (11th Plan, March 2009) and later on the Association of Indian Universities (AIU) stressed on the following recommendations:

- ☞ Semester System
- ☞ Choice Based Credit System
- ☞ Curriculum Development
- ☞ Examination Reforms
- ☞ Administrative Reforms

All the above recommendations for reforms have been reviewed in by representatives of various universities in the Gujarat State and considered for implementation with the aim of transforming Higher Education a transformation where students change from being passive recipients of knowledge to becoming active participants of the knowledge imbibing process. The education system in the State changes from a teacher-centric to learner centric mode. It should aim at all-round integral development of students' personality so that they become good citizens of the new world order.

Salient Features of CBCS in UG Programme :

1. zoology subject in the University/Affiliated Colleges shall offer undergraduate programme in faculty of science from the Academic year 2011 -2012
2. A student will have to get enrolled a core course depending upon his/her requirement of a degree in the said discipline of study. A student will have a choice of selecting an Elective as well as Foundation courses from a pool of courses.
3. Each course shall be assigned a specific number of credits.
4. A core course is the course which should compulsorily be studied by a candidate as a core requirement so as to get degree in a said discipline of study.
5. There shall be four core compulsory courses (Theory) each with 3 credits and their practical's each with 1.5 credits. Thus, credit weightage in Semester V and VI of B.Sc Programme for each core course shall be of 4.5 credits. In short, 4.5 credits multiplied by 4 cores compulsory courses equal to total of 18 credits.
6. In addition to the core courses, a student will have to choose Elective as well as foundation courses from a pool of courses.
7. Two courses of Elective, one each from Generic elective and Interdisciplinary/multidisciplinary/Subject centric electives shall have to be offered. The credit weightage for each Elective course shall be of 02 credits. Hence, a total credit weight-age for Elective courses shall be of 4 credits.
8. One Foundation (English Language) course shall have to be offered. The credit weight-age for foundation course shall be of 02 credits.

Each course shall have a unique course code. The core courses, Elective courses and the foundation courses shall be abbreviated respectively as CC, PC, EG, ES and FC.

1. Core Compulsory -CC
2. Practical core -PC
3. Elective Generic -EG
Elective Subject -ES
4. Foundation Compulsory -FC

Each Academic year shall consist of two semesters, each of 15 weeks of teaching equivalent to 90 working days. The odd semester period shall be from July to November and the Even semester period shall be from December to April.

The course with 4 credits shall be of 60 hrs (15 weeks × 4 credits) duration. The course with 3 credits shall be of 45 hrs (15 weeks × 3 credits) duration. The course with 2 credits shall be of 30 hrs (15 weeks × 2 credits) duration.

A general framework for Bachelor of Science (B.Sc.) programme shall be as follows:

Semester wise credits						Total credits of the Programme
I	II	III	IV	V	VI	144
24	24	24	24	24	24	

The semester wise weightage of core, selective and foundation courses shall be as follows:

Academic year	Core compulsory courses	Elective courses	Foundation courses
Semester I & II	65-75%	15-20%	10-15%
Semester III & IV	65-75%	15-20%	10-15%
Semester V & VI	65-75%	15-20%	10-15%

Attendance:

The Attendance Rules as per the norms of Hemchandracharya North Gujarat University.

Medium Instruction:

The Medium of Instruction shall be of Gujarati medium. Students are free to write answers either in Gujarati or in English language.

Language of Question Paper:

Question paper should be drawn in Gujarati language and its English version should be given.

Evaluation Methods:

1. A student shall be evaluated through Comprehensive Continuous Assessment (CCA)/ (Internal Evaluation) as well as the End of Semester examination (External Evaluation). The weight-age of CCA shall be 30%, whereas the weight-age of the Semester end examination shall be 70%. There will be no internal evaluation in practical courses as well as in elective courses.
2. The Semester assessment (CCA)/ (Internal Evaluation) is spread through the duration of the course and is to be done by the Teacher teaching the course. The assessment is to be done by various means including:

- Internal Test-20 marks
- Assignments/Seminar/MCQ exam, etc. - 05 marks
- Attendance -05 marks

The performance of student in each course is evaluated in terms of percentage of marks with a provision for conversion to grade point. Evaluation for each course shall be done by continuous internal assessment as well as semester end exam and will be consolidated at the end of the course.

3. The End of semester examination (External Evaluation) shall have an assessment based upon following perspective with respect to all the courses:
 - Evaluation with respect to Knowledge
 - Evaluation with respect to Understanding
 - Evaluation with respect to Skill
 - Evaluation with respect to Application
 - Higher Order Thinking Skills
4. With respect to the entire above component, there shall be following types of Questions from each unit of the course.
 - MCQs/Fill in the blanks/ Match the pairs, etc.
 - Short answer questions
 - Medium answer questions
 - Long answer questions
 - Examples/Problems, etc
5. The Examination at the end of semester (Theory) will be conducted by the University. A certified journal of the respective core compulsory course shall be produced at the time of practical examination. In practical exam there will be four practicals in each semester each of 50 marks (40 marks for practical+10 marks for Viva & Journal). Number of student in a practical exam will be 15 to 20 and examiners will be 2 and maximum 3 per practical examination.
6. It will be compulsory for a candidate to obtain passing percentage in both Internal as well as External Evaluation. The passing marks for each course shall be 40% or as decided by concern Board of Studies of the subject.
7. Promotion, Re-Admission and Time for Completion of Course , Procedure for Awarding Grades, Provision for Appeal, etc. as decided by the Hemchandracharya North Gujarat University.
8. Students, who opt zoology as core compulsory subject, should visit National Parks, Sanctuaries, reserve forests etc. within the state and/or outside the state. They should suppose to submit tour report at the time of practical examination.

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN
B.Sc.Programme with 144 credits
CBCS-Semester-Grading Pattern
w.e.f. June-2013

General Pattern/Scheme of study component along with credits for Science faculty.

Particulars	Course	Study component	Instruction Hrs/week	Examination			Credit
				Internal	Uni. Exam.	Total	
B.Sc. Sem.-V	Semester-V						
	Core Compulsory(CC) Course						
	CC-Z 501	Core Course (paper-7)	3	30	70	100	3
	CC-Z 502	Core Course (Paper-8)	3	30	70	100	3
	CC-Z 503	Core Course (Paper-9)	3	30	70	100	3
	CC-Z 504	Core Course (Paper-10)	3	30	70	100	3
		Practical Core (PC) Course					
	PC-Z 501	Practical Core Course (paper-7)	3		50	50	1.5
	PC-Z 502	Practical Core Course (Paper-8)	3		50	50	1.5
	PC-Z 503	Practical Core Course (Paper-9)	3		50	50	1.5
	PC-Z 504	Practical Core Course (Paper-10)	3		50	50	1.5
	Foundation Course (FC)						
	FC-5	Foundation(Generic) Course-V Compulsory English (L.L)	2	30	70	100	2
		Elective Course (E)					
	EG-5	Elective (Generic) Course-V	2		50	50	2
ES-5	Elective (Subject) Course-V	2		50	50	2	
		30	150	650	800	24	
B.Sc. Sem.-VI	Semester-VI						
	Core Compulsory(CC) Course						
	CC-Z 601	Core Course- (paper-11)	3	30	70	100	3
	CC-Z	Core Course- (Paper-12)	3	30	70	100	3

602							
CC-Z 603	Core Course- (Paper-13)	3	30	70	100	3	
CC-Z 604	Core Course- (Paper-14)	3	30	70	100	3	
	Practical Core (PC) Course						
PC-Z 601	Practical Core Course- (paper-11)	3		50	50	1.5	
PC-Z 602	Practical Core Course- (Paper-12)	3		50	50	1.5	
PC-Z 603	Practical Core Course- (Paper-13)	3		50	50	1.5	
PC-Z 604	Practical Core Course- (Paper-14)	3		50	50	1.5	
Foundation Course (FC)							
FC-6	Foundation(Generic) Course-VI Compulsory English (L.L)	2	30	70	100	2	
	Elective Course (E)						
EG-6	Elective (Generic) Course-VI	2		50	50	2	
ES-6	Elective (Subject) Course-VI	2		50	50	2	
		30	150	650	800	24	

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN
B.Sc. Programme (CBCS-Semester-Grading pattern)
Semester End Examination
Format for Question paper Elective Courses (Subject) in Zoology

There will be three questions. First and Second question will be from each r espective Units
and Third will contain questions from both units. The detail format of paper is as under.

Time: 2 hours]

[Total Marks: 50

- | | |
|---|----|
| 1. a. Answer the following (Any one out of two) | 10 |
| b. Attempt any two of following (out of three) | 10 |
| 2. a. Answer the following (Any one out of two) | 10 |
| b. Attempt any two of following (out of three) | 10 |
| 3. Answer the following (Any FIVE out of SEVEN) | 10 |
| (Definition, MCQ, Objective type questions, etc.) | |
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HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN
B.Sc. Programme (CBCS-Semester-Grading pattern)
Semester End Examination
Format for Question paper Core Compulsory Courses in Zoology

There will be five questions. Total marks of the each core compulsory course will be 70. Question No. 1 to 3 carry equal (18) marks and Question No. 4 carry (16) marks. General Format of paper will be as under, provided Examiners are free to use own discretion power to set single question of (18) marks in question number 1 to 3 without giving (a) and (b) option to justify the content of the subject and to check the description ability of students. No change should be made in the format of question number 4.

Time: 3 hours]

[Total marks: 70

- | | |
|---|----|
| 1. a. Answer the following (one out of two) | 10 |
| b. Attempt any one (out of two) | 08 |
| 2 a. Answer the following (one out of two) | 10 |
| b. Attempt any one (out of two) | 08 |
| 3. a. Answer the following (one out of two) | 10 |
| b. Attempt any one (out of two) | 08 |
| 4. a. Answer the following (any six out of ten) | 12 |
| (At least two question from each unit) | |
| b. Attempt the any four (out of seven) | 04 |
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B.SC. SEMESTER-V

ZOOLOGY

Course – VII

CC Z-501

(COMPARATIVE ANATOMY OF VERTEBRATA)

Credit: 3

Internal evaluation: 30 marks [5 – Attendance + 5 – Assignment/Seminar etc. + 20 Test]

External evaluation: 70 marks

UNIT-I TAXONOMY AND ANATOMY OF RAT

- CHARACTERS OF VERTEBRATES; CLASSIFICATION OF AMNIOTES UP TO ORDERS

ANATOMY OF RAT:

- DIGESTIVE SYSTEM
- RESPIRATORY SYSTEM
- STRUCTURE OF HEART
- ARTERIAL AND VENOUS SYSTEM
- STRUCTURE OF BRAIN

UNIT-II COMPARATIVE ANATOMY:

DIGESTIVE SYSTEM AND EXCRETORY SYSTEM

- DIGESTIVE SYSTEM: A. COMPARISON OF TEETH,
B. STOMACH,
C. INTESTINE,
D. LIVER AND PANCREAS
- SKELETAL SYSTEM: A. TYPES OF SKELETAL SYSTEM AND ITS ARRANGEMENT IN THE BODY;
B. COMPARATIVE ANATOMY OF VERTEBRAL COLUMN,
C. PECTORAL GIRDLES AND PELVIC GIRDLES IN VERTEBRATES

UNIT-III COMPARATIVE ANATOMY:

RESPIRATORY SYSTEM AND CIRCULATORY SYSTEM

- RESPIRATORY SYSTEM: COMPARATIVE ANATOMY OF GILLS, SWIM BLADDER AND LUNGS
- CIRCULATORY SYSTEM: A. TYPES OF CIRCULATION AND ITS ROLE IN THE BODY;
B. COMPARATIVE ANATOMY OF HEART AND AORTIC ARCHES IN VERTEBRATES
- NERVOUS SYSTEM: A. COMPARATIVE ANATOMY OF BRAIN;
B. SYMPATHETIC AND PARASYMPATHETIC NERVOUS SYSTEM

REFERENCES

- Comparative anatomy of chordate, W C Weichert
- Comparative vertebrata, Kardong
- A Text book of Chordata, E L Jordan & P S Verma
- A Text book of Chordata, P S Dhama & P S Dhama
- A Life of vertebrata, J Z Young
- A Text book of Chordata, N. Arumugam
- ପୃଷ୍ଠଭାଗ ପ୍ରାକୃତ୍ୟାମ୍ବଳ ଗୁଣଗୁଣାଧିକାରୀ, .୧୧ ପୃଷ୍ଠା,
- .୧୧୧୧, .୧୧ ପୃଷ୍ଠା,

B.SC. SEMESTER-V
ZOOLOGY
LABORATORY COURSE – VII
PC Z 501

(COMPARATIVE ANATOMY OF VERTEBRATA)

Credit: 1.5

***CLASSIFICATION OF HIGHER VERTEBRATES UP TO ORDERS :**

REPTILES: TURTLE; UROMASTIX; GECKO; DRACO; SNAKE

AVES: PIGEON; CROW; SHIKRA; POND HERON; OWL, PELICAN

MAMMALS: BAT; DOLPHIN; RABBIT; LORIS; MANGOOSE

- TO STUDY DIFFERENT SYSTEM OF RAT(AS PER THEORY) THROUGH DEMONSTRATION/MODEL/CHART
 - TO STUDY STRUCTURE AND TYPES OF TEETH IN VERTEBRATES THROUGH SPECIMEN
 - TO STUDY DENTITION IN VARIOUS MAMMALS THROUGH SPECIMEN
 - TO STUDY STRUCTURE OF RUMINANT STOMACH IN MAMMAL THROUGH CHART OR SPECIMEN
 - TO STUDY STRUCTURE OF INTESTINE OF HERBIVORES AND CARNIVORES
 - TO STUDY COMPARISON OF MESONEPHRIC AND METANEPHRIC RENAL ORGAN
 - TO STUDY STRUCTURE OF GILLS AND SWIM BLADDER THROUGH SLIDE AND SPECIMEN
 - TO STUDY COMPARISON OF STRUCTURE OF HEART IN POIKILOOTHERMS AND HOMEOTHERMS THROUGH MODEL AND SPECIMENS
 - TO STUDY COMPARISON OF AORTIC ARCHES IN VERTEBRATES THROUGH MODELS
 - TO STUDY IDENTIFICATION OF GROUP OF ANIMALS THROUGH TYPES OF VERTEBRA ON THE BASIS OF CENTRUM IN VERTEBRATES
 - TO STUDY COMPARISON OF PECTORAL GIRDLES IN VERTEBRATES
 - TO STUDY COMPARISON OF PELVIC GIRDLES IN VERTEBRATES
 - TO STUDY GENERAL STRUCTURE OF BRAIN OF VERTEBRATE THROUGH SPECIMEN OR MODEL
 - TO STUDY COMPARISON OF ANATOMY OF BRAIN IN DIFFERENT GROUP OF VERTEBRATES
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HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN
Practical Examination
B.Sc. Sem. V Zoology
PC Z 501

(COMPARATIVE ANATOMY OF VERTEBRATA)

Time: 5 HOURS

[Total Marks: 50

Date:

1. **Identify the given organ/system and compare its anatomical features in relation to their adaptation, draw its labeled diagram and show it to examiner.** 12
(Heart, Aortic arches, kidney, Brain, Pectoral and Pelvic girdles)
 2. **Draw a labeled diagram of _____ system of Rat and show it to examiner** 08
 3. **Draw a labeled diagram of _____ structure of Rat and show it to the examiner** 05
 4. **Do as directed:** 15
 1. **Identify and classify it up to order with proper reasons.**
 2. **Identify and classify it up to order with proper reasons.**
 3. **Identify and explain its structural importance.**
(gills, swim bladder, ruminant stomach, tooth,)
 4. **Identify the group of animal through given specimen and draw a labeled diagram.** (vertebra, girdles, Dentition)
 5. **Identify the pointed part and state its function/s.**
(Any part of organ system which may not be asked in previous exercise)
 5. **Viva-voce** 05
 6. **Journal** 05
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**B.SC. SEMESTER-V
ZOOLOGY
Course-VIII
CC Z 502**

(DEVELOPMENTAL BIOLOGY)

Credit: 3

Internal evaluation: 30 marks [5 – Attendance + 5 – Assignment/Seminar etc. + 20 Test]

External evaluation: 70 marks

UNIT-I FUNDAMENTALS OF EMBRYOLOGY

- INTRODUCTION AND SCOPE
- GAMETOGENESIS: OOGENESIS; SPERMATOGENESIS
- FEMALE GAMETE: STRUCTURE OF EGG; TYPES OF EGGS;
- MALE GAMETE: STRUCTURE OF SPERM; TYPES OF SPERM

UNIT-II FERTILIZATION AND CLEAVAGE


- FERTILIZATION: DEFINITION; APPROXIMATION OF GAMETES; SPERM PENETRATION; ACROSOMAL REACTION; CORTICAL REACTION; PHYSIOLOGICAL CHANGES DURING FERTILIZATION
- CLEAVAGE: PLANES OF CLEAVAGE; PATTERNS OF CLEAVAGE; TYPES OF BLASTULA

UNIT-III DEVELOPMENT OF FROG AND CHICK

- MORULA STAGE; BLASTULA; FATE MAP; PROCESS OF GASTRULATION (MORPHOGENETIC MOVEMENT) AND GASTRULA STAGE
- ORGANOGENESIS OF FROG: BRIEF IDEA OF ORGANOGENESIS; FORMATION OF NEURAL TUBE; FORMATION OF HEART
- METAMORPHOSIS
- DEVELOPMENT OF CHICK EMBRYO TO THE HOUR INCUBATION: 24 HOURS; 33 HOURS; 48 HOURS; 72 HOURS
- EXTRA EMBRYONIC MEMBRANES IN CHICK
- REGENERATION: TYPES AND EVENTS (HISTOLOGICAL CHANGES); REGENERATION CAPACITY IN DIFFERENT ANIMAL; FACTORS INFLUENCING REGENERATION

REFERENCES

- Embryology, M.P.Arora, Himalaya Publishing house, Bombay
- A Text book of Embryology, N. Arumugam, Saras Publications
- Chordate Embryology, V. K. Agrawal & P.S. Verma, S. Chand & company LTD.,2004 (Developmental biology)

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ZOOLOGY
LABORATORY COURSE – VIII
PC Z 502 (DEVELOPMENTAL BIOLOGY)

Credit: 1.5

- TO STUDY PROCESS OF SPERMATOGENESIS THROUGH PERMENANT SLIDE
- TO STUDY DIFFERENT TYPES OF SPERM THROUGH PERMENAT SLIDE
- TO PREPARE TEMPORARY MOUNT OF SPERM FROM COLLECTED SAMPLE
- TO STUDY PROCESS OF OOGENESIS THROUGH PERMENANT SLIDE
- TO STUDY DIFFERENT TYPES OF EGG THROUGH PERMENANT SLIDE OR SPECIMEN
- TO STUDY ABNORMAL EGG OF HEN
- TO STUDY TYPES OF CLEAVAGE THROUGH PERMENANT SLIDES
- TO STUDY PATTERNS OF CLEAVAGE THROUGH PERMENANT SLIDES
- TO COMPARE BLASTULA STAGE IN FROG AND CHICK THROUG PERMENANT SLIDES
- TO COMPARE GASTRULA STAGE IN FROG AND CHICK THROUG PERMENANT SLIDES
- TO STUDY FORMATION OF VARIOUS ORGANS THROUGH PERMENANT SLIDES OF T.S. AND L.S. PASSING THROUGH RELATED ORGANS IN FROG
- TO STUDY METAMORPHOSIS OF FROG THROUGH MODELS/PERMENANT SLIDES/LIVE SET UP
- TO STUDY STRUCTURE OF EGG OF HEN BY FRESH AND BOILED NON -FERTILIZED EGG
- TO STUDY DEVELOPMENT OF CHICK EMBRYO IN RESPECT TO HOURS INCUBATION THROUGH PERMENANT SLIDES(AS PER THEORY)
- TO PREPARE TEMPORARY MOUNT OF CHICK EMBRYO FROM FERTILIZED EGG
- TO STUDY TORSION AND FLEXION IN CHICK THROUGH PERMENANT SLIDES/CHARTS
- TO STUDY REGENERATION IN HOUSE LIZARD (SELF STUDY)
- TO STUDY DEVELOPMENT OF CHICK THROUGH WINDOW PREPARATION.

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN

Practical Examination

B.Sc. Sem. V Zoology

PC Z 502

(DEVELOPMENTAL BIOLOGY)

Time: 5 HOURS

[Total Marks: 50

Date:

- | | |
|---|----|
| 1. Prepare a temporary mounting of chick embryo, stain it if necessary, determine the hours of development and show it to examiner. | 10 |
| 2. Prepare a temporary mounting of sperm from given material, stain if necessary, sketch a labeled diagram and show it to examiner. | 7 |
| 3. Do as directed: | 15 |
| a. Identify and describe the process (p.s. of gamatogenesis) | |
| b. Identify and describe. (Eggs/cleavage) | |
| c. Identify and describe. (Blastula/ Gastrula) | |
| d. Identify and comment. (Metamorphosis/ T.S. through organs) | |
| e. Identify and give its significance. (Torsion/flexures) | |
| 4. Viva-voce | 5 |
| 5. Journal | 5 |
| 6. Submission | 8 |

B.SC. SEMESTER-V
ZOOLOGY
Course-IX
CC Z 503 (GENETICS)

Credit: 3

Internal evaluation: 30 marks [5 – Attendance + 5 – Assignment/Seminar etc. + 20 Test]

External evaluation: 70 marks

UNIT-I BASICS OF INHERITANCE

- HISTORY OF GENETICS;
- LAWS OF INHERITANCE IN VERY BRIEF (as studied in 1st sem);
- INTERACTION OF NON-ALLELES:
 - o COMPLEMENTARY GENES;
 - o EPISTASIS;
 - o LETHAL GENES;
- CYTOPLASMIC INHERITANCE: KAPPA PARTICLES IN PARAMOECIUM; SHELL COILING IN SNAIL
- SEX LINKED INHERITANCE: COLOR BLINDNESS IN HUMAN ; FEATHERS IN POULTRY

UNIT-II PHYSICAL AND CHEMICAL BASIS OF INHERITANCE

- STRUCTURE AND ORGANIZATION OF CHROMOSOME & GIANT CHROMOSOME S
- KARYOTYPE
- CHROMOSOMAL ABBERATIONS
- MOLECULAR STRUCTURE OF GENE
- GENETIC CODE
- PROTEIN SYSTHESIS
- REGULATION OF GENE EXPRESSION(in prokaryotes)

UNIT-III HUMAN GENETICS

- PE-DEGREE ANALYSIS
- ORIGIN AND TYPES OF TWINS
- USE OF HUMAN GENETICS IN MEDICAL SCIENCE
- BRIEF IDEA OF HUMAN GENOME PROJECT
- INTRODUCTORY IDEA OF EPIGENETICS AND PROTEOMICS

REFERENCES

- **Concept of Genetics, R L Kotpal, Rastogi publications, Meerat**
- **Genetics Classical to Modern, P K Gupta, Rastogi publications, Meerut**
- **Genetics, Dr. R P Meyyan, Saras Publications**
- **A Text book of Genetics, V. B. Rastogi, Rastogi Publications, Meerut**
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B.SC. SEMESTER-V
ZOOLOGY
LABORATORY COURSE – IX
PC Z 503 (GENETICS)

Credit: 1.5

- TO STUDY STRUCTURE OF CHROMOSOME THROUGH PERMANENT SLIDE OF MITOSIS
- TO STUDY STRUCTURE OF CHROMOSOME THROUGH TEMPORARY PREPARATION OF ONION ROOT TIP.
- TO STUDY PROCESS OF MEIOSIS THROUGH PERMANENT SLIDES
- TO PREPARE TEMPORARY MOUNTING OF SALIVARY GLAND CHROMOSOME (GIANT POLYTENE CHROMOSOME) FROM CHIRONOMOUS LARVA.
- TO SOLVE PROBLEMS OF POST-MENDELIAN GENETICS
- TO SOLVE PROBLEMS OF SEX-LINKED INHERITANCE
- TO PREPARE AND STUDY NORMAL KARYOTYPE
- TO PREPARE AND STUDY ABNORMAL KARYOTYPE
- TO STUDY INHERITANCE IN HUMAN THROUGH PE-DEGREE ANALYSIS METHOD.
- TO STUDY TYPES OF TWINS THROUGH CHART/PHOTOS
- TO STUDY MATERNAL INHERITANCE THROUGH H CHART.
- TO STUDY CHROMOSOMAL ANEUPLOIDY THROUGH CHART
- TO STUDY CHROMOSOMAL ABERRATION THROUGH CHART.

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN

Practical Examination

B.Sc. Sem. V

Zoology

PC Z 503 (GENETICS)

Time: 5HOURS]

[Total Marks: 50

Date:

1. Make a temporary preparation of _____ from given material. 10
Show it to Examiner. (Giant chromosome)
2. Make temporary preparation of _____ from given material. 5
Show it to Examiner. (Mitosis)
3. Solve the given genetical problem: 10
A. on the basis of Post-Mendelian genetics
B. On the basis of Sex-linked Inheritance/
Draw PE-Degree chart by using given information
4. Prepare a Karyotype from given Information/photograph and Identify. 6
State important features of an individual
5. Do as directed: Specimens 9
 - a. Identify and describe(Twins; cytoplasmic inheritance, aneuploidy)
 - b. Identify and describe
 - c. Identify and state its law of inheritance.
6. Journal 5
- Viva-voce 5

B.SC. SEMESTER-V

ZOOLOGY

Course-X

CC Z 504
(ENVIRONMENTAL BIOLOGY AND TOXICOLOGY)

Credit: 3

Internal evaluation: 30 marks [5 – Attendance + 5 – Assignment/Seminar etc. + 20 Test]

External evaluation: 70 marks

UNIT-I ENVIRONMENTAL BIOLOGY

- DEFINITION, SCOPE AND IMPORTANCE
- **ENVIRONMENTAL COMPONENT**: ATMOSPHERE; HYDROSPHERE; LITHOSPHERE & BIOSPHERE
- **ENVIRONMENTAL FACTORS**: TEMPERATURE; LIGHT AND HUMIDITY
- **ENVIRONMENTAL PROBLEM**: GLOBAL WARMING & GREEN HOUSE EFFECT; GLOBAL OZONE PROBLEM AND ACID RAIN

UNIT-II ENVIRONMENTAL POLLUTION

- **DEFINITION; CAUSES; EFFECT AND CONTROL MEASURES OF** :
 - o AIR POLLUTION
 - o WATER POLLUTION
 - o SOIL POLLUTION; NOISE POLLUTION
 - o THERMAL POLLUTION
- **SOLID WASTE MANAGEMENT**: CAUSES, EFFECT AND CONTROL MEASURE OF URBAN AND INDUSTRIAL WASTES
- ROLE OF AN INDIVIDUAL IN PREVENTION OF POLLUTION

UNIT-III TOXICOLOGY

- DEFINITION & SCOPE OF TOXICOLOGY
- TYPES OF TOXIN
- TYPES OF TOXICITY
- **DOSE**: LD 50; LC 50; THRESHOLD DOSE
- **FACTORS AFFECTING TOXICITY**: SIZE OF ANIMAL; AGE; SEX; SPECIES; FOOD & FEEDING; ROUTE & RATE
- **TOXICITY OF HEAVY METALS**: CADMIUM; LEAD; MERCURY
- MECHANISM OF ACTION OF ORGANOPHOSPHATES (pesticides)
- ROUTE OF ENTRY OF TOXICANTS
- EFFECT OF TOXIN ON ORGAN SYSTEM AND BEHAVIOR
- TOXINS & THEIR ANTIDOTES
- MINAMATA DISEASE

REFERENCES

- Environmental Biology, P C Das, ATTBS publishers, Delhi, India
- Environmental Pollution and Control, Dineshkumar Bhatt, Cybertach publication, New Delhi
- Concept of Ecology, N. Arumugam, Saras Publications
- Ecology and Environment, P D Sharma, Rastogi Publications, Meerat
- Toxicology(Principles and Methods), M A Subramanian, MJP Publishers, Chennai
- Toxicology, P D Sharma, Rastogi Publications, Meerat
- Elements of Toxicology, Dr. K Pande & Dr J Shukla, Dominant publishers, New Delhi
- Environmental Biology and Toxicology, P D Sharma, Rastogi Publications

B.SC. SEMESTER-V
LABORATORY COURSE-X
ZOOLOGY

CC Z 504
(ENVIRONMENTAL BIOLOGY AND TOXICOLOGY)

Credit: 1.5

- To study various instrument to measure climatic factors
- To estimate Calcium hardness of sample water from different sources
- To estimate total hardness of sample water from different sources
- To estimate total alkalinity of sample water from different sources
- To estimate chlorinity of sample water from different sources
- To study physical properties of different types of soil
- To study chemical properties of different types of soil
- To determine LC 50 of heavy metals
- To study effect of heavy metal on behavior of select ed organism
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HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN
Practical Examination
B.Sc. Sem. V Zoology
PC Z 504

(ENVIRONMENTAL BIOLOGY AND TOXICOLOGY)

TIME: 5HOURS
DATE:

[TOTAL MARKS: 50

1. Estimate the amount of _____ from given water 10

- Samples. State your conclusion as environmental point of view .**
- 2. Estimate the amount of _____ from given soil Sample. State your conclusion regarding texture and usefulness. 10**
 - 3. Determine LC 50 of _____ toxicant and state your Conclusion/Suggestions if any. 08**
 - 4. Prepare a graphic representation with help of the given climatic Data. 04**
 - 5. Write as per instruction for the given ecological apparatus, Instruments, 04**
 - a. Principle**
 - b. Labeled diagram**
 - c. Mode of action**
 - d. Use**
 - 6. Identify and comment on given chart A & B related to environment and pollution . 04**
 - 7. Journal 05**
 - Viva-voce 05**
-

**B.SC. SEMESTER-VI
ZOOLOGY
Course – XI
CC Z-601
(BIOCHEMISTRY)**

Credit: 3

Internal evaluation: 30 marks [5 – Attendance + 5 – Assignment/Seminar etc. + 20 Test]

External evaluation: 70 marks

UNIT-I CARBOHYDRATES

- **MONOSACCHARIDES: ISOMERISM; HAVARTH'S AND FIHSER'S FORMULA; CLASSIFICATION**

- **OLIGOSACCHARIDES:** MALTOSE; LECTOSE; SUCROSE; CELLOBIOSE; GENERAL STRUCTURE AND THEIR IMPORTANCE
- **POLYSACCHARIDES:**
 1. HOMOPOLYSACCHARIDES: STARCH; GLYCOGEN; CELLULOSE, CHITIN; INULIN
 2. HETEROPOLYSACCHARIDES;
- BIOLOGICAL IMPORTANCE OF CARBOHYDRATES

UNIT-II LIPID

- **FATTY ACIDS:** PHYSICAL AND CHEMICAL PROPERTIES OF FATTY ACID
- **ALCOHOL:** FORMATION OF TRIGLYCERIDES; LIPID FORMATION;
- **CLASSIFICATION:** SIMPLE LIPID; COMPOUND LIPID; DERIVED LIPID
- BIOLOGICAL IMPORTANCE OF LIPID

UNIT-III PROTEINS

- **AMINOACID:** CLASSIFICATION; PHYSICAL AND CHEMICAL PROPERTIES
PEPTIDE AND PROTEIN FORMATION
- **CHEMICAL BONDS:** BONDS OF PROTEIN; SECONDARY BOND OF PROTEIN
- STRUCTURE OF PROTEIN MOLECULE
- CLASSIFICATION OF PROTEINS

REFERENCES

- Biochemistry, S C Rastogi, Tata McGrawHill, New Delhi
- Biochemistry, Satyanarayan
- A Text Book of Biochemistry, A K Berry, Emkay publications, De lhi
- Elements of Biochemistry, H S Shrivastav, Rastogi Publications, Meerat
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B.SC. SEMESTER-VI
LABORATORY COURSE - XI
ZOOLOGY
CC Z-601
(BIOCHEMISTRY)

Credit: 1.5

CARBOHYDRATES

- **DETECTION OF MONOSACCHARIDES:** GULCOSE; FRUCTOSE
- **DETECTION OF DISACCHARIDES:** LACTOSE; MALTOSE; SUCROSE
- **DETECTION OF POLYSACCHARIDES:** STARCH; CASEIN

PROTEIN

- DETECTION OF PROTEIN: EGG ALBUMIN; PEPTON

LIPID

- DETECTION OF OIL THROUGH BIOCHEMICAL TEST

ATOMIC MODEL

- PREPARATION OF BALL & STICK ATOMIC MODEL OF FOLLOWING MOLECULES
 - CARBOHYDRATES: GLUCOSE; FRUCTOSE; GALACTOSE; MALTOSE; LACTOSE; SUCROSE
 - AMINO ACIDS
 - LIPID: GLYCEROL

ENZYME ACTIVITY

- DETECTION OF ENZYME ACTIVITY ON CARBOHYDRATE(STARCH) AT NOR MAL TEMPERATURE/PH
- DETECTION OF ENZYME ACTIVITY ON CARBOHYDRATE(STARCH) AT LOW TEMPERATURE/ACIDIC P^H
- DETECTION OF ENZYME ACTIVITY ON CARBOHYDRATE(STARCH) AT HIGH TEMPERATURE/BASIC P^H
- TO STUDY MECHANISM OF ACTION OF ENZYME(LOCK & KEY MECHANISM) THROUGH MODEL/CHART

BONDS AND STRUCTURES

- TO STUDY THE DIFFERENT TYPES OF BONDS OF PROTEIN COMPOUND THROUGH MODEL/CHART.
 - TO STUDY THE PRIMARY, SECONDARY AND TERTIARY STRUCTURES OF PROTEINS THROUGH MODEL/CHART.
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HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN

Practical Examination

B.Sc. Sem. VI

Zoology

PC Z 601

(BIOCHEMISTRY)

Time: 5 HOURS]

Date:

[Total Marks: 50

1. Detect the unknown substance from given sample by performing biochemical tests. Conclude and show it to examiner.	15
2. Perform the experiment that shows enzyme digest the food stuff in the mouth. Conclude and show it to examiner.	10
3. Prepare Ball and stick model of molecule as per instruction given by examiner.	6
4. Do as directed:	9
a. Identify and describe the bond of given molecule.	
b. Identify and explain the structure of given molecule.	
c. Identify and describe. (Lock and key model of an enzyme)	
5. Viva voce	5
6. Journal	5

B.SC. SEMESTER-VI
ZOOLOGY
Course-XII
CC Z 602
(ECOLOGY AND ANIMAL BEHAVIOR)

Credit: 3

Internal evaluation: 30 marks [5 – Attendance + 5 – Assignment/Seminar etc. + 20 Test]

External evaluation: 70 marks

UNIT-I COMMUNITY ECOLOGY

- DEFINITION & TERMINOLOGY OF ECOLOGY
- CHARACTERISTICS OF A COMMUNITY
- STRUCTURE OF A COMMUNITY

- COMMUNITY DOMINANT AND STRATIFICATION
- CHARACTERS USED IN COMMUNITY STRUCTURE
- ANALYTICAL CHARACTERS(QUANTITATIVE CHARACTERS)
- ECOLOGICAL NICHE, CONCEPTS OF COMMUNITY

UNIT-II ECOSYSTEM

- DEFINITION
- TYPES OF ECOSYSTEM
- STRUCTURE OF ECOSYSTEM:
TERRESTRIAL: FOREST ECOSYSTEM; GRASSLAND ECOSYSTEM
FRESH WATER: POND ECOSYSTEM
- STRUCTURE OF ECOSYSTEM
- ECOLOGICAL PYRAMIDS
- FOOD CHAIN & FOOD WEB
- PRODUCTIVITY OF ECOSYSTEM
- INTERACTION AMONG ORGANISMS

UNIT-III FUNDAMENTALS OF ETHOLOGY & LEARNING BEHAVIOR

- INTRODUCTION TO ETHOLOGY
- APPROACH TO STUDY ETHOLOGY
- MOTIVATION AND FIXED ACTION PATTERN
- INNATE BEHAVIOR; SIGN STIMULI
- OBSERVATION TECHNIQUE AND SAMPLING IN THE FIELD

LEARNING BEHAVIOR: HABITUATION; CONDITIONAL REFLEX; TRIAL & ERROR LEARNING; LATENT LEARNING; DISCRIMINATION LEARNING; IMPRINTING AND INSIGHT

- PARENTAL CARE IN ANIMALS

REFERENCES

- Ecology and Environment, P D Sharma, Rastogi Publications
- Concept of Ecology, N. Arumugam, Saras Publications
- पारिस्थितिकी, ए. एस.
- Animal Behaviour, Reena Mathur, Rastogi Publications, Meerut
- Animal Behaviour, Ranga, Agrobios, Jodhpur
- Animal Behaviour, M P Arora, Himalaya publishing House, Delhi
- An Introduction to Animal Behaviour, Manning & Dawkins, Cambridge uni. press

B.SC. SEMESTER-VI LABORATORY COURSE-XII ZOOLOGY PC Z 602 (ECOLOGY AND ANIMAL BEHAVIOR)

CREDIT: 1.5

- TO STUDY ECOLOGICAL PYRAMID OF DIFFERENT ECOSYSTEM THROUGH CHART
- TO STUDY POSITIVE AND NEGATIVE INTERACTIONS AMONG ANIMAL THROUGH SPECIMENS OR DIRECT OBSERVATION OR THROUGH CHART

- TO VISIT DIFFERENT PLACES AND TO PREPARE REPORT REGARDING HABITAT -ADAPTATIONS AND INTERRELATIONSHIP WITH OTHER BIOTIC COMPONENT.
 - TO STUDY INSTRUMENTS FOR DIFFERENT METHODS OF LEARNING BEHAVIOR
 - TO STUDY HABITUATION IN MOSQUITOES LARVA/SNAIL
 - TO STUDY TRIAL AND ERROR METHOD OF LEARNING IN HUMAN THROUGH MAIZE/PLAYING CARDS
 - TO STUDY LEARNING BEHAVIOR IN RAT IN ZIGZAG MAIZE
 - TO STUDY PARENTAL CARE IN INVERTEBRATES THROUGH MUSEUM SPECIMEN OR THROUGH FIELD VISIT
 - TO STUDY PARENTAL CARE IN VERTEBRATES THROUGH MUSEUM SPECIMEN OR THROUGH FIELD VISIT
 - PREPARE AN ETHOGRAM OF ANIMAL/BIRD
-

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN
Practical Examination
B.Sc. Sem. VI Zoology
PC Z 602
(ECOLOGY AND ANIMAL BEHAVIOR)

Time:
Date:

[Total Marks: 50

1. Perform the experiment to acquire skill by using equipment as per Instruction
A. Playing cards B. Zigzag maze

10

C. Pyramid	D. Arrow and Board	
Prepare a graph of		
	1. Attempt v/s Errors,	
	2. Attempt v/s Time ,	
	3. Blind end v/s Errors and Conclude.	
2. Perform the experiment on _____ and record _____		06
behavior and conclude.		
A. Mosquito larva –Habituation		
B. Cockroach – Grooming		
3. Find out _____ and _____ by using quatitative		10
analysis method		
4. Do as directed: Specimens		10
1. Identify and describe its uses.		
2. Identify and explain parental care (Invertebrates)		
3. Identify and explain parental care (Vertebrate)		
4. Identify and describe its Habitat		
5. Identify and comment		
5. Viva-voce		05
Journal		05

B.SC. SEMESTER-VI

ZOOLOGY

Course-XIII

CC Z 603

(EVOLUTION; ZOOGEOGRAPHY AND BIODIVERSITY)

Credit: 3

Internal evaluation: 30 marks [5 – Attendance + 5 – Assignment/Seminar etc. + 20 Test]

External evaluation: 70 marks

UNIT-I EVOLUTION

- DEFINITION
- EVIDENCES OF EVOLUTION: ANATOMICAL & EMBRYOLOGICAL
- MUTATION THEORIES

- ISOLATION & VARIATION
- HARDY-WEINBERG LAW
- **ADAPTATIONS**: AQUATIC; CURSORIAL; ARBOREAL; VOLANT & PARASITIC
- BIOLUMINESCENCE
- LIVING FOSSILS
-

UNIT-II ZOOGEOGRAPHY

- DEFINITION
- ORIENTAL REGIONS
- PALAEARCTIC REGION
- ETHIOPIAN REGION
- NEARCTIC REGION
- NEOTROPICAL REGION
- AUSTRALIAN REGION

UNIT-III BIODIVERSITY

- DEFINITION & TYPES OF BIODIVERSITY
- VALUE & THREATS TO BIODIVERSITY
- BIODIVERSITY CONSERVATION STRATEGY: IN-SITU AND EX-SITU
- ENDANGERED AND ENDEMIC SPECIES OF INDIA
- NEEDS OF MUSEUM
- PROJECT VULTURE CONSERVATION

REFERENCES

- Genetics and Evolution, S S Khanna, Central Book Depot, Allhabad
- Organic Evolution, N. Arumugam, Saras Publications
- Evolution, Dobzhansky, Surjeet Publications, Delhi
- **બાહ્ય સંપદા**
- **પ્રાણીજગત**
- Biodiversity (principles and conservation), U Kumar and M. Asizs, Agrobios, Jodhpur
- Global Biodiversity conservation major, Khan & Azmi, Point er Publishers, Jaipur

B.SC. SEMESTER-VI
LABORATORY COURSE – XIII
ZOOLOGY
PC Z 603
(EVOLUTION; ZOOGEOGRAPHY AND BIODIVERSITY)

Credit: 1.5

- To study Homologous organs among animals(anatomical evidences)
- To study analogous organs among animals(anatomical evidences)
- To study embryological evidences in evolution through model

- To study process of evolution through mutation through chart.
- To study various types of adaptations found in different habitat: terrestrial; arboreal; Volant; fossorial; aquatic; cursorial
- To study examples of Hardy-Weinberg law in human population
- To study fauna of different zoogeographical realms
- To study specimens of Living fossils
- To prepare a report on survey of biodiversity of selected local areas
- To prepare a checklist of waterfowl found in nearby water body

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN

Practical Examination

B.Sc. Sem. VI Zoology

PC Z 603

(EVOLUTION; ZOOGEOGRAPHY AND BIODIVERSITY)

Time: 5 HOURS]

[Total Marks: 50

Date:

- | | |
|--|----|
| 1. To solve given problem of Hardy-Weinberg law | 10 |
| 2. Identify and discuss from evolution point of view. (evolutionary evidences) | 05 |
| 3. Compare the adaptations of the given animal and justify their habitat | 06 |
| 4. Do as directed | 15 |
| 1. Identify and describe its characters (realms) | |
| 2. Identify and state vertebrate fauna found in it. | |

3. Identify and describe its adaptations	
4. Identify and describe its present status	
5. Identify and describe	
5. Viva-voce	05
6. Journal	04
7. Study tour report	05

B.SC. SEMESTER-VI
ZOOLOGY
Course-XIV
CC Z 604

(TOOLS & TECHNIQUES; IMMUNOLOGY & RADIATION BIOLOGY; BIostatistic)

Credit: 3

Internal evaluation: 30 marks [5 – Attendance + 5 – Assignment/Seminar etc. + 20 Test]

External evaluation: 70 marks

UNIT- I TOOLS AND TECHNIQUES

- **CHROMATOGRAPHY**: PRINCIPLE, TYPES OF CHROMATOGRAPHY, USE
- **COLORIMETRY**: PRINCIPLE, TYPES OF SPECTROPHOTOMETRY, USE
- **CENTRIFUGATION**: PRINCIPLE, TYPES OF CENTRIFUGE, TYPES OF ROTOR, USES
- **MICROSCOPY**: PRINCIPLE; TYPES OF MICROSCOPE; STRUCTURE OF COMPOUND AND ELECTRON MICROSCOPE

UNIT-II IMMUNOLOGY AND RADIATION BIOLOGY

IMMUNOLOGY:

- CONCEPT OF IMMUNOLOGY
- TYPES OF IMMUNITY
- TYPES OF IMMUNOGLOBULIN

- ANTIGEN- ANTIBODY REACTION
- HYPERSENSITIVITY

RADIATION BIOLOGY:

- TYPES OF RADIATION
- EFFECT OF RADIATION ON HUMAN HEALTH
- GIEGER MULLER COUNTER

UNIT-III BIOSTATISTIC

- CONCEPT OF VARIATION (DISPERSION)
- MEASURES OF VARIATION
- MERITS AND DEMERITS
- APPLICATIONS OF MEASURES OF VARIATION
- RANGE
- QUARTILE DEVIATION
- AVERAGE(MEAN) DEVIATION
- STANDARD DEVIATION

REFERENCES

- Biochemistry, S C Rastogi, Tata McGrawHill, New Delhi
- Biochemistry, Satyanarayan
- A Text Book of Biochemistry, A K Berry, Emkay publications, Delhi
- Elements of Biochemistry, H S Shrivastav, Rastogi Publications, Meerat
- Immunology, Dulsy Fatimas & N. Arumugam, Saras P ublications
- Biology of Immuneresponse, Pitter Abramoff, Tata McGrawHill Publications
- Basics of Biophysics, M.Denial, Agrobios(India)
- Radiation Biology,
- Elements of Biostatistics, S.Prasad, Rastogi Publications
- Biostatistics, P Ramakrishnana, Saras Publica tions

B.SC. SEMESTER-VI LABORATORY COURSE- XIV ZOOLOGY PC Z 604

(TOOLS & TECHNIQUES; IMMUNOLOGY; BIOSTATISTIC; BIOPHYSICS)

Credit: 1.5

- To find out Rf value of unknown amino acid through paper chromatography
- To study principle and working method of Thin Layer Chromatography
- To study structure and principle of centrifuge
- To study structure and principle of spectrophotometer
- To study working principle of Microscope
- To detect own blood group by using antisera (antigen-antibody reaction)
- To solve problems of variation as per theory syllabus
- To solve problems of standard deviation as per theory syllabus

- To study structure of Geiger Muller Counter

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN

Practical Examination

B.Sc. Sem. VI Zoology

PC Z 604

(TOOLS & TECHNIQUES; IMMUNOLOGY; BIOSTATISTIC; BIOPHYSICS)

Time: [Total Marks: 50

Date:

1. Find out Rf value of given unknown amino acid and show your conclusion to the examiner 12
2. Detect your own blood group through proper method and explain Immunological point view 08
3. a. Solve the given problem based on variation. 04

b. Solve the given problem based on Standard deviation.	04
4. Do as directed.	12
1. Identify and explain its principle (Tools)	
2. Identify and describe its uses (Tools, Radiation)	
3. Identify and draw its structure (Ig, Antigen-Antibody reaction)	
4. Identify and describe (Radiation biology)	
5. Viva voce	05
6. Journal	05
