MATHEMATICS

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North Gujarat University
PATAN

EMCHANDRAC AR A N RT JARAT UNIVERSITY
PATAN- 384 265

Modified Detailed Syllabus of CBCS PROGRAMME Pattern for B Sc Mathematics Semester System

PROGRAM CODE : HNGU1054

With Effect from June : 2015

FACULTY : SCIENCE

SUBJECT : MATHEMATICS

CLASS: Bachelor of Science.

SEMESTER : I to VI

TOTAL PAGE 01 T 27 (WITH C RSE STRUCTURE)

DATE : October 18, 2014.

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B Sc in Mathematics : PROGRAMME Structure Under CBCS

With Effect from June : 2015

M. B. Prajapati, ***Department of Mathematics,***
Hemchandracharya North Gujarat University, Patan-384265.

Mission: Our mission is to provide opportunities for developing basic-quality mathematical skills and achievement for their betterment of life through scientific and technological development.

Learning outcomes: Four major focusing areas: Logical Reasoning & Motivation; Analysis & Problem solving; Information & Technology Proficiency.

Vision: To Motivate Individuals to excel in the mathematical basic knowledge-driven environment of the 21st century through curriculum and train integrally human resources through teaching.We **Focus** on quality education.

(1) EDUCATIONAL AIMS :

Mathematics is one of the fundamental disciplines in science. It is the basic for all the disciplines. To make education more effective and learner centric, restructurisation of curriculum becomes essential. As a positive step in this direction and in order to respond to the emerging trends in the global scenario, it is decided to introduce the Choice Based Credit System (CBCS) from the academic year 2011-12 and modified it after three years. Under this system, the academic programme becomes student-oriented, relevant, interdisciplinary and flexible.

(2) CONDITIONS FOR ADMISSION :

A candidate who has passed the H Sec-Science Degree examination of the state or any other examinations accepted by the Syndicate as equivalent thereto shall be eligible for admission to this B Sc Programme in Mathematics on full-time basis of study.

INTAKE rules for admission are as per University notification from time to time.

Students are allowed to take admissions to successive semesters under carry over benefit facility as per the norm decided by the university .

(3) ***LEARNING OUTCOMES :***The programme leading to this degree provides the opportunities to develop and demonstrate knowledge and understanding in the following areas:

- **Knowledge and understanding :**When one has completed this degree he/she will have knowledge and understanding of the fundamental concepts, principles and techniques from a range of topic areas.
- **Cognitive skills :**When one has completed this degree he/she will be able to understand how to solve some problems using the methods taught and develop abstract mathematical thinking .
- **Practical skills:** When one has completed this degree, he/she will be able to demonstrate the Communicate clearly knowledge, ideas and conclusions about mathematics and improve his/her own learning and performance.

(4) DURATION OF THE COURSE:

The CBCS pattern B. Sc. programme with multidisciplinary approach in Mathematics is offered on a full-time basis. The duration of the course is of three academic years consisting of six semesters each of 15 weeks duration.

(5) TEACHING, LEARNING METHODS :

All relevant material is provided and taught in the course texts and through the study of set books. One will build up knowledge gradually, with sufficient in-text examples to support one's understanding. He/She will be able to assess his/her own progress and understanding by using the in-text problems and exercises at the end of each unit in form of practical using computer in computer laboratory.

(6) ***COURSE OF STUDY :***

The curriculum has five major components:

1. *Principle/Core Courses (CC MAT)*
2. *Practical courses (PC MAT)*
3. *Elective Opt. Disciplinary courses (ES MAT)*
4. *Elective Generic course*
5. *Foundation Course*

There are at least 144 Credit COURSEs prescribed in the above classification as per the university norms to be studied to acquire B.Sc. Degree in Mathematics.

⇛ COURSE STRUCTURE ☒

SEMESTER-I Course	Courses	Credit /course	Teaching Hrs Total	Total Credits	Examination Internal	Hours	External	Total Marks
Principle/Core Courses: CC MAT-111	1	4	4	4	30	3	70	100
Practical/ PC MAT-111	1	2	4	2	-	-	50	50
Elective Opt. Disciplinary: ES MAT –11 Set Theory & Functions	1	2	2	2	-	-	50	50
Elective Generic	1	2	2	2	-	-	50	50
Foundation Course	1	2	2	2	15	1.5	35	50
SEMESTER-II								
Principle/Core Courses: CC MAT-122	1	4	4	4	30	3	70	100
Practical/ PC MAT-122	1	2	4	2	-	-	50	50
Elective Opt. Disciplinary: ESMAT –12 Industrial Mathematics	1	2	2	2	-	-	50	50
Elective generic	1	2	2	2	-	-	50	50
Foundation course	1	2	2	2	15	1.5	35	50
SEMESTER-III								
Principle/Core Courses: CC MAT-301	1	3	3	3	30	3	70	100
Principle/Core Courses: CC MAT-302	1	3	3	3	30	3	70	100
Practical/ PC MAT-301	1	1.5	3	1.5	-	-	50	50
Practical/ PC MAT-302	1	1.5	3	1.5	-	-	50	50
Elective Opt. Disciplinary: ESMAT –21 Business Mathematics-1	1	2	2	2	-	-	50	50
Elective generic	1	2	2	2	-	-	50	50
Foundation course	1	2	2	2	15	1.5	35	50
SEMESTER-IV								
Principle/Core Courses: CC MAT-401	1	3	3	3	30	3	70	100
Principle/Core Courses: CC MAT-402	1	3	3	3	30	3	70	100
Practical/ PC MAT-401	1	1.5	3	1.5	-	-	50	50

Practical/ PC MAT-402	1	1.5	3	1.5	-	-	50	50
Elective Opt. Disciplinary: ESMAT –22 Business Mathematics-II	1	2	2	2	-	-	50	50
Elective generic	1	2	2	2	-	-	50	50
Foundation course	1	2	2	2	15	1.5	35	50
SEMESTER-V								
Principle/Core Courses: CC MAT-501	1	3	3	3	30	3	70	100
Principle/Core Courses: CC MAT-502	1	3	3	3	30	3	70	100
Principle/Core Courses: CC MAT-503	1	3	3	3	30	3	70	100
Principle/Core Courses: CC MAT-504	1	3	3	3	30	3	70	100
Practical/PC MAT-501	1	1.5	3	1.5	-	-	50	50
Practical/PC MAT-502	1	1.5	3	1.5	-	-	50	50
Practical/PC MAT-503	1	1.5	3	1.5	-	-	50	50
Practical/PC MAT-504	1	1.5	3	1.5	-	-	50	50
Elective Opt. Disciplinary: ESMAT –31 Business Mathematics-III	1	2	2	2	-	-	50	50
Elective generic	1	2	2	2	-	-	50	50
Foundation course	1	2	2	2	15	1.5	35	50
SEMESTER-VI								
Principle/Core Courses: CC MAT-601	1	3	3	3	30	3	70	100
Principle/Core Courses: CC MAT-602	1	3	3	3	30	3	70	100
Principle/Core Courses: CC MAT-603	1	3	3	3	30	3	70	100
Principle/Core Courses: CC MAT-604	1	3	3	3	30	3	70	100
Practical/PC MAT-601	1	1.5	3	1.5	-	-	50	50
Practical/PC MAT-602	1	1.5	3	1.5	-	-	50	50
Practical/PC MAT-603	1	1.5	3	1.5	-	-	50	50
Practical/PC MAT-604	1	1.5	3	1.5	-	-	50	50
Elective Opt. Disciplinary: ESMAT –32 Business Mathematics-IV	1	2	2	2	-	-	50	50
Elective generic	1	2	2	2	-	-	50	50
Foundation course	1	2	2	2	15	1.5	35	50

N.B. :1. *Work-load depends on the number of students and the number of Batches/Groups , for practical and Cognitive-skill based Course.*

2. As the *CBCS has a high probability to be operationalised efficiently and effectively for the elevating learners* , the Essential Requirements for all Mathematical Practical including MATLAB Practicals of Mathematical subjects are as under:

1. **Mathematical Laboratory inbuilt with sufficient number of Computers (as per the students enrollments and the number of practical batches) and MATLAB SOFTWARE with basic requirements for the MATLAB Practicals.**
2. **Mathematical Laboratory inbuilt with Graphs, Charts, Printer, Physical Models (two dimensional as well as three dimensional) & Virtual Models (Higher Dimensional – Computerized) and basic requirements for the same.**
3. Use also "PYTHON" Software instead of MATLAB Software.
4. ***Essential Requirement for Mathematical Computer Laboratory:***

(i) Atleast One full time Computer Operator having mathematical ability to run Matlab Software and related Computerized Mathematical Practical.

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(ii) One Peon for computer laboratory.

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Mathematics : Semester : III

CC –MATH- 301Calculus and Linear Algebra

Unit : I : LIMIT , CONTINUITY AND PARTIAL DERIVATIVES
Function of severable variables, their limits and continuity, partial derivatives, Differentiability and differential, Conditions for commutativity of d independent variables in higher ordered derivatives, Derivatives of implicit functions

Unit : II : APPLICATION OF PARTIAL DERIVATIVES
Euler's theorem on homogeneous function, Extrema of function of severable variables, Application of Lagranges method of undetermined multiplies, Tailor and Maclorin's expansion for function of two variables, Tangent line and normal plane to twisted curves, Tangent plane and normal to surfaces.

Unit : III : VECTOR SPACE and LINEAR TRANSFORMATION
Vector spaces, Subspaces, Span of a set, More about subspaces, Linear dependence and Independence, Dimension and Basis. Definition and examples, Range and kernel of a linear map, Rank and Nullity, Inverse of a linear transformation, Consequences of a Rank-nullity theorem.

The main book for the course (Unit I and II) is ' **Differential Calculus' by Shantinarayan, S. Chand , New Delhi**

The main book for the course (Unit III and IV) is ' **An Introduction to Linear Algebra, by V. Krishnamurthy, V P Mainra, J L Arora, Affiliated East-west Press Pvt Ltd., New Delhi**
Unit : III – Chapter 3 : Topics 3.1 to 3.6 Unit : IV – Chapter 4 : Topics 4.1 to 4.8

Reference Books :

Calculus :

(a) Advanced Calculus, D V Widder , Prentice Hall , New Delhi
(b) Advanced Calculus Vol : I & II, T M Apostol, Blaisdoll
(c) Advanced Calculus, R C Buck, MacMillan
(d) Kalan Shashtra Part I , D H Pandya and N D Suthar, University Granth Nirman Board (Gujarati)
(e) Kalan Shashtra Part II, A M Vaudya and V H Pandya, University Granth Nirman Board (Gujarati)

Linear Algebra :

(f) Linear Algebra , Ramchandra Rao, P. Bhimasankar, Tata MacGrawHill
(g) Topics in Algebra, I N Herstein, Wiley Eastern Ltd
(h) Linear Algebra, S K Berberion, Oxford University Press
(i) Linear Algebra Problem Book, P R Holmos, Cambridge University Press
(j) Linera Algebra, Sharma and Vashishtha, Krishna Prakashan, Meerut
(k) Linear Algebra, Gupta K P, Pragati Prakashan, Meerut
(l) Linear Algebra, G Paria, New Central book agency Ltd, Calcutta
(m) Surekh Bij Ganit, I H Sheth, University Granth Nirman Board (Gujarati)

Course: CC – MATH – 302NUMERICAL ANALYSIS

Unit-1: **Finite Differences table and theory of interpolation:**
Ascending and Descending differences , Symbolic operators, Difference of polynomial, Factorial polynomials, Gregory-Newton's forward and backward interpolation formula.

Unit-2: **Divided Differences:**
Newton's divide difference interpolation formula, Lagrange's interpolation formula for equal and unequal intervals. **Central Differences Interpolation Formula:**
Gauss forward and backward interpolation formula, Sterling interpolation formula, Bessel's

interpolation formula.

Unit-3: **Numerical Differentiation and Integration:**
Taylor's method, Picard's method, Trapezoidal rule, Simpson's 1/3 rule, Simpson's 3/8 rule, Euler's Method

Reference books:

1. **Numerical Analysis** by Kunz, McGraw Hill
2.**Numerical Analysis** by R. Gupta, Anmol Pub.Pvt.Ltd, New Delhi.
3.Numerical Analysis P.N.Chatterji Rajson's Prakashanmandir, Meerut.
4. Methods in Numerical Analysis K.W.NelsonMac-Millan
5.Numerical Methods Dr.V.N.Vedomurthy, Vikas Publishing House Pvt. Ltd .
6. **Numerical Methods in Engineering and Science,** Dr.B.S.Grewal,Khanna Pub.
7. **Numerical Analysis and Computational Procedures,** S.A.Mollah, New Central Book Agency, Calcutta.

PC –301 : Practicals on Caculus and Linear Algebra

1 Application of Limit and Continuity (Two Practicals)
2 Application of Partial Derivatives (Two Practicals)
3 Application of Lagranges' method of undermined multiplies
4 Application of Euler's theorem
5 Application of Tailor's and Maclaurin theorems.
6 Applications of Vector Space
7 Applications of Subspaces
8 Geometrical meaning of Basis
9 To Expand linearly independent set upto a basis of a vector space
10 Verification on Dimension theorem
11 Verifications on Linear transformation
12 Verifications on Rank-Nullity theorem
13 To find the inverse of a Linear transformations
14 To find composition of linear maps

PC – 302 : Practicals on Numerical Analysis

Unit-1:
1 Application of Gregory-Newton forward formula.
2 Application of Gregory-Newton backward formula.
3 Application of Factorial polynomials.

Unit-2:
(1)Applications of Newton's divided difference formula.
(2) Application of Lagrange's interpolation formula for equal intervals.
(3) Application of Lagrange's interpolation formula for unequal intervals.
(4**)** Application of Gauss forward interpolation formula.
(5) Application of Gauss backward interpolation formula.
(6) Application of Sterling interpolation formula.

Unit-3:
(1) Application of Taylor's method.
(2)Application of Picard's method.
(3)Application of Trapezoidal rule.
(4)Application of Simpson's 1/3 rule.
(5)Application of Simpson 3/8 rule.

Subject Elective Course :ESMAT-21 Business Mathematics-1

Unit:1 Logic: [only examples] Logical Statements, Truth table, Negation, Compound statements, Tautologies and Contrdiction, Negation of Compound statements, Propositions, Conditional and Biconditional statements. **Set Theory:** [only examples] Definition and Methods of sets, types of sets, Venn diagrams, Operation s on sets, De-Morgan's law, Finite and Infinite sets.

Unit:2 Permutations and Combinations: [only examples] Fundamental rules of counting, Definition of Permutations and Permutation of n different things, Permutation of repeated things, Circular Permutation, Definition of Combination standard results and examples.

Referance books:

(1)Business Mathematics. BY. D.C.Sancheti & V.K.Kapoor,S Chad & Sons Publication, New Delhi.
(2) Business Mathematics. by. B.S.Shah Prakashsan, Ahmedabad.

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NAAC Accreditation Grade- "B"

FACULTY OF SCIENCE

U.G.(B. Sc.)Programme

Subject: **BOTANY**

Under CBCS :: Semester :: Grading Pattern

Syllabus and Examination Scheme for

Semesters: III and IV

With effect from

June 2013 and December 2013

REVISED & UPGRADED

syllabus of B Sc. Semester-III & IV in BOTANY

Date: 01/08/2013

Total Pages: **1 to 30**

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NAAC 'B' (CGPA) Accredited (State University)

Under CBCS :: Semester :: Grading Pattern

U.G.(B. Sc.) Programme

in

Faculty of

Science

B. Sc. Semesters: III and IV

Revised & Upgraded Syllabus

in Subject

Botany

With effect from

June 2013 and December 2013

Submitted on

01/08/2013

Total Number of Pages

1 to 30

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Revised & Upgraded SYLLABUS for

B. Sc. (Semester III and IV) **programme in**

BOTANY

IN FORCE FROM

ACADEMIC YEAR

June 2013 and December 2013

Summary of the Programme

✓ Syllabus duration	Semester pattern i.e., **Six** months
✓ *No. of core compulsory (CC) course*	***02** (in each semester)*
✓ *Credits per CC course*	*03*
✓ *Total credits for CC course*	***06**/Semester*
✓ *Theory lectures per CC course*	*03 /week*
✓ *Total Theory lectures for CC course*	*06 /week*
✓ No. of Practical courses per semester	**02**
✓ Practical lectures	03 /week/course/batch
✓ Total Practical lectures	06 /week/ batch
✓ Credits per Practical course	**1.5**
✓ Total Credits of Practical course	**03**/Semester
✓ No. of Practical course (in Uni. Exam.)	**02**/Semester
✓ No. of Elective Subjective (ES) course	**01**(in each semester)
✓ Credits for ES course	**02** (in each semester)
✓ Theory lectures per ES course	02/week
✓ No. of Elective Generic (EG) course	**01**
✓ Credits for EG course	**02**
✓ Theory lectures per EG course	02/week
✓ Examination (including Preparation)(weeks)	05
✓ No. of Days per week	06
✓ Weeks (days) available for Teaching	**15** (90)
✓ Duration of each lecture (minutes)	55
✓ No. of students/batch	**20**(on approval of AC and Exam. unit)

Under Choice **B**ased **C**redit **S**ystem-Semester-Grading System pattern
U G (B Sc) Programme in Botany
Semester-III and IV

The 11th Five Year plan of India proposed various measures for academic reforms in higher education. Keeping in view the challenges of the changed times 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 thus 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: CBCS in UG programme in **Botany Semester III and IV** shall be offered from the Academic year **June 2012 and December 2012** respectively.

- ✓Botany subject in the Universities/Affiliated Colleges shall offer undergraduate programme in Faculty of Science from the Academic year 2011-12.
- ✓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.
- ✓Each course shall be assigned a specific number of **Credits**.
- ✓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.
- ✓There shall be two **Core Compulsory** courses (Theory) each with **3 credits** in each semester and their practical's each with **1.5 credits**. Thus, a credit weight-age in **B Sc** programme for each semester core course shall be of **6 credits**. In short, **9** credits multiplied by **2**subjects equal to total of **18 credits**.
- ✓In addition to the Core courses, a student will have to choose Elective as well as Foundation courses from a pool of courses.
- ✓**Two** courses of **Elective**, one each from **Generic Elective** and Interdisciplinary / Multidisciplinary / **Subject centric electives** shall have to be offered. The credit weight-age for each Elective course shall be of **02 Credits**. Hence, a total credit weight-age for Elective courses shall be of **4 credits**.
- ✓One **Foundation** (English Language L.L.) course shall have to be offered. The credit weight-age for Foundation course shall be of **02 credits**.

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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**
   Practical Core (Core Elective) **PC**
2. Elective Generic **EG**
   Elective Subject **ES**
3. Foundation Compulsory **FC**

Each Academic year shall consist of **two** semesters, each of **15weeks** 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 x 4 credits) duration. The course with **3 credits** shall be of **45 hrs** (15 weeks x 3 credits) duration. The course with **2 credits** shall be of **30 hrs** (15 weeks x 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**	
24	24	24	24	24	24	**144**

The semester wise weight age of core, elective 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 of Instruction:

The Medium of Instruction shall be of **Gujarati medium**. Student is free to write answers either in **Gujarati** and/or **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**.

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2. The In Semester assessment (**CCA**)/ (**Internal Evaluation**) is spread through the duration of the course and is to be done by the Teacher teaching the course. BoS of the subjects will decide various criteria and their weight-age for CCA. The assessment is to be done by various means including:

   - ✓ Written Tests
   - ✓ MCQs based Tests/Quiz
   - ✓ Presentations/Seminars
   - ✓ Project work/Field work
   - ✓ Group discussions/Group activities
   - ✓ Assignments, etc.

   The distribution of **Internal Evaluation** is given as per criteria given below for **30** marks:

Written Test…	**20** marks,
Assignments/MCQs/Very Short questions…	**05** marks and
Attendance, Regularity, Punctuality…	**05** marks.

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 all the above components, 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 End of Semester Examination will be conducted by the University. A certified journal of the respective practical course **must be produced** at the time of practical examination by the student.

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%** as decided by concern Board of Studies in Botany.

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.

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Study tour:

Botanical excursion/study tour may be arranged (by the concern faculty with prior permission of **HoD and/or Principal**) within state and/or outside the state to explore/study plant diversity in its natural habitats.

Submission:

Instead of submission of Herbarium sheets and/or specimens at the time of final (Uni.) practical examination student may submit photographs/drawings or CD having such photographs/drawings of plant species to conserve plant species in their natural habitats and to avoid any damage to plant species and its natural habitat.

Selection of Elective (Subjective) course:

For semester-III and IV a common list of three courses is given below. Students are requested to select any one of three courses in Semester-III and then in Semester-IV one course may be selected from the rest of the two courses.

1. **Elective (Subject) Course :: ES BOT-211:: DNA-a molecule of Life**
2. **Elective (Subject) Course :: ES BOT-212 :: Water quality analysis**
3. **Elective (Subject) Course :: ES BOT-213 :: Biodiversity**

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN						
B.Sc. three year (General) Programme with 144 credits Semester-III and IV in BOTANYw.e.f. June-2012 and December-2012 respectively						
General Pattern/Scheme of study components along with credits						
Study Components		**Ins. Hrs/ Week**	**Examination**			**Credit**
			Internal Marks	**Uni. Exam.** Marks	**Total** Marks	
Semester-III						
	Core Compulsory (CC)Course					
CC-I-3	Core Course-I (Paper-3)	3	30	70	100	**3**
CC-I-4	Core Course-I (Paper-4)	3	30	70	100	**3**
CC-II-3	Core Course-II (Paper-3)	3	30	70	100	**3**
CC-II-4	Core Course-II (Paper-4)	3	30	70	100	**3**
	Soft-skill: Practical Core (PC)Course					
PC-I-3	Practical Core Course-I (Paper-3)	3		50	50	**1.5**
PC-I-4	Practical Core Course-I (Paper-4)	3		50	50	**1.5**
PC-II-3	Practical Core Course-II (Paper-3)	3		50	50	**1.5**
PC-II-4	Practical Core Course-II (Paper-4)	3		50	50	**1.5**
	Foundation Course (FC)					
FG-21	Compulsory English (L.L.)	2	30	70	100	**2**
	Elective Course (EC)					
EG-21	Elective (Generic) Course	2		50	50	**2**
ES-21	Elective (Subject) Course	2		50	50	**2**
		30	**150**	**650**	**800**	**24**
Semester-IV						
	Core Compulsory (CC)Course					
CC-I-5	Core Course-I (Paper-5)	3	30	70	100	**3**
CC-I-6	Core Course-I (Paper-6)	3	30	70	100	**3**
CC-II-5	Core Course-II (Paper-5)	3	30	70	100	**3**
CC-II-6	Core Course-II (Paper-6)	3	30	70	100	**3**
	Soft-skill: Practical Core (PC)Course					
PC-I-3	Practical Core Course-I (Paper-5)	3		50	50	**1.5**
PC-I-4	Practical Core Course-I (Paper-6)	3		50	50	**1.5**
PC-II-3	Practical Core Course-II (Paper-5)	3		50	50	**1.5**
PC-II-4	Practical Core Course-II (Paper-6)	3		50	50	**1.5**
	Foundation Course (FC)					
FG-21	Compulsory English (L.L.)	2	30	70	100	**2**
	Elective Course (EC)					
EG-21	Elective (Generic) Course	2		50	50	**2**
ES-21	Elective (Subject) Course	2		50	50	**2**
		30	**150**	**650**	**800**	**24**

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HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN
Under CBCS-Semester-Grading pattern

B.Sc. (Semester-III and IV) Programme

REVISED

Common format for Question paper

Core Complementary Course in Botany

Time: **3Hours** [w. e. f. June 2013] Total Marks: **70**

1. Long answered and medium answered/short note-typed questions from each Unit-I **20**

a. Long answered questions (Attempt any **two** from **three** each of **7** marks)

b. Medium answered or short note-typed questions (Attempt any **two** from **three** each of **3** marks)

2. Long answered and medium answered/short note-typed questions from each Unit-II **20**

a. Long answered questions (Attempt any **two** from **three** each of **7** marks)

b. Medium answered or short note-typed questions (Attempt any **two** from **three** each of **3** marks)

3. Long answered and medium answered/short note-typed questions from each Unit-III **20**

a. Long answered questions (Attempt any **two** from **three** each of **7** marks)

b. Medium answered or short note-typed questions (Attempt any **two** from **three** each of **3** marks)

4. Questions such as, MCQs, Fill in the blanks, Match the pairs, very short answered questions, etc. **10**
(Each of **1** Mark) [Total **10**, at least **three** questions from each Unit]

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B.Sc. (Semester-III and IV) Programme

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Common format for Question paper

Elective (Subject) Course in Botany

Time: **2Hours** [w. e. f. June 2013] Total Marks:**50**

1. Long answered and medium answered/short note-typed questions from each Unit-I **20**

a. Long answered questions (Attempt any **two** from **three** each of **7** marks)

b. Medium answered or short note-typed questions (Attempt any **two** from **three** each of **3** marks)

2. Long answered and medium answered/short note-typed questions from each Unit-II **20**

a. Long answered questions (Attempt any **two** from **three** each of **7** marks)

b. Medium answered or short note-typed questions (Attempt any **two** from **three** each of **3** marks)

3. Questions such as, MCQs, Fill in the blanks, Match the pairs, very short answered questions, etc. **10**

(Each of **1** Mark) [Total **10**, **Five** questions from each Unit]

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Semester-III

Core Compulsory Course :: CC-BOT-211

(*Morphology, Gymnosperm and Palaeobotany, Cell Biology*)

Core Compulsory Course :: CC-BOT-212

(*Plant Physiology, Plant Ecology, Genetics*)

Semester-IV

Core Compulsory Course :: CC-BOT-221

(*Morphology and Angiosperms, Angiosperm families, Plant Anatomy*)

Core Compulsory Course :: CC-BOT-222

(*Angiosperm Embryology, Biochemistry, Plant Physiology*)

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B. Sc. Programme : Semester-III

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN
Under CBCS-Semester-Grading pattern

B.Sc. (Semester-III) Programme

Core Compulsory Course in BOTANY

CC-BOT-211

(*Morphology, Gymnosperm and Palaeobotany, Cell Biology*)

Theory teaching hours**:3 Hours/week** Credit: **3.0**

Practical teaching hours**: 3 Hours/week** Credit: **1.5**

Unit-I :: MORPHOLOGY

[A] **BRACTS AND INFLORESCENCE**: **Bracts**: Definition and types of Bracts (SSC 280-281): Foliaceous (GDD 118), Petaloid (GDD 118), Spathe (GDD 119), Involucre (GDD 120) and Epicalyx (GDD 120). **Inflorescence**: Definition (GDD 121).**Racemose**: Definition (121), **Types**: Raceme (121), Spike (122), Umbel (124), Capitulum (126). **Cymose**: Definiiton (126), **Types**: Solitary (SSC 283/GDD 126), Monochasial (Helicoid and Scorpoid) (SSC 284/ GDD 126-127), Dichasial(SSC 285/ GDD 127) and Polychasial cyme (SSC 285/ GDD 127-128).

[B] **FLOWER**: **Definition and parts**of flower (GDD 132). **Kinds of flower**: Actinomorphic and Zygomorphic(GDD 133), Tri_, Tetra_ and Pentamarous(GDD 134), Hypogynous (GDD 137), Perigynous and Epigynous(GDD 138). **Calyx, Corolla and Perianth**: Numbers and Unity (SSC 292-295). **Aestivation**: Definition (GDD 144).**Types**: Valvate, Twisted, Imbricate, Quinquencial, Vexillary (GDD 144/SSC 298-299).

[C] **ANDROECIUM**: **Cohesion of stamens**: Mono_, Di_ and Polydelphous (SSC 299-300/ GDD 150), **Attachment of filament to the anther**: Adnate, Dorsifixed, Basifixed and Versatile (SSC 304-305/ GDD 148). **GYNOECIUM**: Free or United (GDD 151/SSC 310), Number (GDD 151/SSC 311). **PLACENTATION**: Definition (GDD 155).**Types**: Axile, Marginal, Parietal and Basal (GDD 155-156/SSC 313-314). **POLLINATION**: Definition (GDD 161), explanation of self-pollination (GDD 161) and cross-pollination (GDD 161).Mode of Pollination in *Ficus*(GDD 169),*Calotropis* (GDD 170) and *Vallisneria* (GDD 172).

References:

SSC:**Santra S C, Chatterjee T P and Das A P** (1993, 1st edition) **College Botany Practical Vol.-II.** New Central Book Agency (P) Ltd, Kolkatta.

GDD:**Gangulee H C, Das K S and Datta C** (1993, New Print) **College Botany Vol.-I.** New Central Book Agency (P) Ltd, Kolkatta.

PRACTICALS:

Question 1. Study of morphology examples as per theory syllabus through fresh/preserved specimens.

Specimen **D :: Bracts: Foliaceous bract**: *Adhatodavasica,* **Petaloid bract**: *Bougainvillea spectabilis,***Spathe**: *Rhoeo discolor,* **Involucre**: *Helianthus annuas*and**Epicalyx**: *Hibiscus rosa-sinensis.*

Specimen **E :: Inflorescence:Racemose: Raceme:** *Caesalpinia***, Spike:** *Achyranthes***, Umbel: Simple:** Onion**and Compound:**Coriander**, Capitulum:**Sunflower**.**
Cymose: Solitary: Terminal:*Datura***, Axillary:**Shoeflower**, Monochasial: Helicoid:** *Hamelia***; Scorpoid**: *Heliotropium*, **Dichasial**: *Clerodendrum*, **Polychasial**:*Calotropis.*

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Specimen **F :: Flower**: **Actinomorphic**: Shoe-flower, **Zygomorphic**: Pea/Bean, **Hypogynous**: *Datura,* **Perigynous:** Rose, **Epigynous**:*Coccinia.*

Calyx, Corolla:Polysepalous/ Polypetalous: Mustard,Gamosepalous/ Gamopetalous: *Datura.* **Perianth**: *Crinum*

Specimen **G :: Aestivation**: **Valvate**: Calyx of *Datura,* **Twisted**: Corolla of *Hibiscus,* **Imbricate**: *Crotalaria*/Bean, **Quincuncial**: Corolla of *Citrus*/*Murrayaor* Calyx of *Ipomoea,* **Vexillary**:*Butea*/Pea flower.

Specimen **H :: Androecium**:**Cohesion**: Monadelphous:Shoeflower, Diadelphous: Bean/Pea, Polyadelphous:*Bombax.* **Attachment***: Dorsifixed: Sesbania*, Basifixed:*Adhatoda*and Versatile:*Crinum*/Grass.

Specimen **I :: Gynoecium**:Apocarpous ovary: Rose,Syncarpous ovary:Shoeflower. **Placentation**:Axile: Shoeflower, Marginal: Pea/Bean, Parietal:*Argemone*andBasal: Sunflower.

Study of mode of pollination as per theory syllabus through fresh/preserved specimens.

Unit-II :: GYMNOSPERM and PALAEOBOTANY

[A] **Gymnosperm:** General characters of Gymnosperm (JRM 3-4).**CYCAS** (JRM 26-62): Classification (Bierhorst,1971), habit-habitat (VPC 235), Sporophyte: general morphology (236-237), Anatomy of leaf and coralloid root, reproduction (247), gametophyte (except development) (256) and embryogeny (259).

[B] **Fossils:** Definition (MH 455), Formation (MH 455/JRM 267-268) and Types (MH 456/JRM 268-269) of Fossils: Petrification (GK 892), Cast/Incrustation (GK 893), Impression (GK 894) and Compression (GK 894-895).Geological Time-scale (GK 890-891).

[C] **Fossils of Pteridophytes**:*Rhynia*((MH 473/JRM 271-272). *Lepidodendron* (MH 485-487/JRM 272-273/GK 954-55) and *Lepidostrobus* (MH 487-488/GK 956).The false seed: *Lepidocarpon* (MH 491/GK 957). **Fossils of Gymnosperms**: The stem: *Lyginopterisoldhamia* (JRM 278-281/GK 1060-62) and The seed: *Lagenostomalomaxii* (JRM 282-283/GK 1062-63).

References:

VPC: **Vasishta P C, Sinha A K and Kumar Anil**(2009, Reprint) **Botany for Degree students-GYMNOSPERMS** (Multicolour illustrative edition). S. Chand & Co. Ltd, New Delhi.

JRM: **Johri R M, LataSneh and TyagiKavita**(2005) **A Textbook of Gymnosperm**.Dominant Publishers &Distributors, New Delhi.

MH: **Mukherji H**(1990, 9thedition reprint) **Plant Groups**.New Central Book Agency, Kolkatta.

GK: **Gangulee H C and Kar A K**(1993, New Print). **College Botany Vol.-II**.New Central Book Agency, Kolkatta.

PRACTICALS: Question 1 a and b::Gymnosperm: Fresh and/or Preserved specimens of following plant species.

Cycas: Vegetative structures, Microsporophyll, Megasporophyll

Specimen **J** :: T.S. of *Cycas* leaflet to show transfusion tissue, T S of coralloid root. *Cycas:* Microspores
Slide/specimen **K** :: **Fossils/Palaeobotany**:
Fossil Pteridophytes: **Permanent slides:**Rhynia, *Lepidodendron, Lepidostrobus, Lepidocarpon*
Specimens: *Lepidodendron.*
Fossil Gymnosperms: Permanent slides: *Lyginopterisoldhamia*, *Lagenostomalomaxii*
Specimens: *Lyginopterisoldhamia.*

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UNIT-III: CELL BIOLOGY

[A] **THE CELL WALL:** Introduction (V&A 146), **Chemical composition**: Cellulose (V&A 147), Hemicellulose (V&A 147), Pectins (V&A 148), Lignin (V&A 148).**The wall layers**: The primary wall (V&A 148), Secondary wall (V&A 148) and Middle lamella (V&A 148). Plasmodesmata (V&A 149-150). Functions of cell wall (V&A 150-151).Schizogenous and lysigenous cavity (PBP 67-68).

[B] **THE PLASMA MEMBRANE:** Introduction (V&A112), **Chemical composition**: Lipids, proteins and carbohydrates (V&A 114-115). **Membrane models**: Sandwich model (V&A 117), Unit-membrane hypothesis (V&A 118) and Fluid-mosaic model(V&A 118-119), Function of plasma membrane and its types according to permeability (V&A 125-126).

[C] **THE CELL DIVISION:** Historical (V&A318), Cell cycle and Mitosis (318-326), Significance (329). Meiosis: process and various phases (332-339), Significance (339). Comparison (340).

References:

V&A: **Verma P S** and**Agarwal V K** (2006, Reprint) **Cell Biology, Genetics, Molecular Biology, Evolution** and **Ecology**. S. Chand & Co. Ltd, New Delhi.
PBP: **PandeyBP** (1982) **Plant Anatomy**. S. Chand & CO.

PRACTICALS:

Question 2. Material **C ::** Various stages of Mitotic division in Onion root tip and Meiotic division in flower bud.
Specimen-L:: Study of cell wall and plasma membrane through Microphotographs/charts/diagrams/slides.

Study of various stages of cell division Mitosis and Meiosis through permanent slides.

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Hemchandracharya North Gujarat University, Patan

B. Sc.(Semester-III) Practical Examination, March/April-20

Botany Practical::PC BOT-211

[Based on: **CC-BOT-211**]

(*Morphology, Gymnosperms and Palaeobotany, Cell Biology*)

[In force from **June 2013**]

Date: / /20 **Place:**

Time:**4 Hours**] [Maximum Marks: **50**

1. a. આપેલ નમૂનો **A** ઓળખો, યોગ્ય કારણો આપી વર્ગીકરણ કરો (કુળ સુધી) અને તેમાં જોવા મળતી રચનાકીય લાક્ષણિકતાઓ જણાવો.

[Identify, classify giving suitable reasons (up to family) and describe the structural peculiarities observed in the given specimen**A**.] **4**

b. આપેલ નમૂના **B**માંથી _____ ખુલ્લુ કરો/સ્થાપન કરો.

[Expose/Mount _____from the given specimen **B**.] **3**

2. આપેલ પદાર્થ **C**માંથી સમવિભાજન / અર્ધસૂત્રીભાજનનું અકાયમી સ્થાન તૈયાર કરો. યોગ્ય અભિરંજન પધ્ધતિના ઉપયોગથી કોષવિભાજનની અવસ્થા(ઓ) આકૃતિ(ઓ) સહિત પરીક્ષકને બતાવો.

[Prepare a temporary mounting of **Mitosis**/**Meiosis** from given material **C.** Using appropriate staining method show stage(s) of cell division to the examiner with diagram(s).] **8**

3. આપેલ નમૂનાઓ **D** થી **I** ને ઓળખો અને આકૃતિ સહિત તેમાં જોવા મળતી બાહ્યાકાર વિદ્યાનું વર્ણન કરો.

[Identify and describe with diagram the external morphology observed in given specimens **D** to **I**.] **18**

4. આપેલ નમૂનાઓને ઓળખો અને તેમાં જોવા મળતી લાક્ષણિકતાઓ લખો.

[Identify and mention peculiarities seen in given specimens.] **09**

1. કાયમી સ્લાઈડ/નમૂનો **J** (અનાવૃત્તબીજધારી).
   [Permanent slide/specimen **J** (Gymnosperm).]
2. અશ્મિની સ્લાઈડ/નમૂનો **K**(ત્રિઅંગી અથવા અનાવૃતબીજધારી અશ્મિ).
   [Fossil's slide/specimen **K** (Pteridophyte or Gymnosperm fossil).]
3. માઈક્રોફોટોગ્રાફ/ચાર્ટ/સ્લાઈડ **L** (કોષવિદ્યા).
   [Microphotograph/chart/diagram/slide **L** (Cell Biology).]

5. a. સબમીશન અને *મૌખિક પ્રશ્નોત્તરી.* [Submission and *viva-voce*.] **5**

b. પ્રયોગપોથી [Journal.] **3**

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HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN
Under CBCS-Semester-Grading pattern

B. Sc. Programme : Semester-III

Core Compulsory Course in BOTANY

CC-BOT-212

(*Plant Physiology, Plant Ecology, Genetics*)

Theory teaching hours: 3 Hours/week **Credits: 3.0**

Practical teaching hours: 3 Hours/week **Credits: 1.5**

Unit-I :: PLANT PHYSIOLOGY

[A] **WATER:** Structure of water molecule (D&W 33), Properties of water important to plants (34), Solutions (34-35). Role of water in plant life (M&G 163).

[B] **SOLUTIONS:** Definition of solvent, solute and solution.**Types**: True, colloidal and suspension. Explanation of Hypertonic, Isotonic and Hypotonic solutions.**Colloidal systems**: Introduction (D&W 499), Phases (499), properties: Tyndall effect (500), Brownian movement (501), Filtration (501), Adsorption (501), Electrical properties (501-502), Flocculation and Precipitation (502-503), Dialysis ().

[C] **PLANT WATER RELATIONS:** Diffusion (M&G 155). Osmosis: Definition (155), laws of osmosis (156-157), **Types**: Exosmosis and endosmosis, role of osmosis in plants (162-163). Plasmolysis (D&W 42) and Deplasmolysis (D&W 42). Imbibition and its importance (K&K 65-66).

References:

M&G: **Mukherji S** and**Ghosh A K** (2005, Revised) **Plant Physiology**. New Central Book Agency Pvt Ltd, Kolkatta.

D&W: **Devlin R M** and**Witham FH**(1986, First Indian Edition) **Plant Physiology** (Fourth Ediiton). CBS Publishers & Distributors, New Delhi.

K&K: **Kochhar P L** and **Krishnamoorthy H N** (1985, 16th Revised Edition) **Plant Physiology**. Atma Ram & Sons, Delhi.

PRACTICALS:

Question 1: Perform following physiological experiments:

1. To show the process of osmosis through potato osmoscope/*Colocasia* petiole.
2. To show the processof Plasmolysis using *Rhoeo* leaf peelings and sucrose solutions (Show Non plasmolyzed cell, incipient and complete plasmolyzed cell).
3. To separate Starch and Salt by Dialysis.
4. To study the property of Mechanical adsorption of colloids using sand particles.
5. To study the property of Electrical adsorption of colloids using Whatman No. 1 filter paper.
6. To study phenomenon of diffusion through ring formation using ammonia and hydrochloric acid.

Question 4(B): Demonstrate following physiological experiments:

1. To study osmosis using Thistle funnel.
2. To study imbibitional pressure exerted by imbibed seeds.
3. To show the process of exosmosis by using green grapes and salt solution.
4. To show the process of endosmosis by using dried black grapes and water.
5. To show the phenomenon of Tyndall effect.

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Unit-II :: PLANT ECOLOGY

[A] **ECOLOGICAL ADAPTATIONS**: Classification (on the basis of water requirements) [SPD 82], External and internal features of Hydrophytes (83-94), Mesophytes (94) and Xerophytes-Non-succulents (94 & 96-104).

[B] **COMMUNITY ECOLOGY**: Definition (173), characteristics of a community (174), structure (175-176).

[C] **CHARACTERS USED IN COMMUNITY STRUCTURE**: Analytical- Quantitative (179-181) and Qualitative (181-185) characters, Synthetic characters (186). Methods of study of communities: Physiognomic methods (187) and Phytosociological methods (188-191).

Reference:

SPD: **Sharma P D** (2003, 7th edition-reprint) **Ecology and Environment**. Rastogi Publications, Meerut.

PRACTICALS:

Question 2:

1. To determine the minimum size of Quadrat (Sampling unit) by species area curve method to study the grassland communities.
2. To determine the minimum number of Quadrat (Sampling unit) to be laid down in the field to study the grassland communities.
3. To Determine the Frequency of any five plants of Grassland communities using Quadrat, then distribute them among Raunkiaer's frequency classes. Compare with the Normal frequency diagram using graph paper.
4. To determine the abundance of any five plant species using quadrat of any size (area) to study the grassland communities.
5. To determine the density of any five plant species using quadrat of unit size (area) to study the grassland communities.

Question 3(A): Ecological adaptations-morphological and anatomical studies of following plantparts:*Hydrilla* stem,*Eichhornia* petiole, Sunflower stem, Sunflower leaf, *Nerium* leaf, *Capparis* stem.

Question 4(C): Permanent slides: T S of *Hydrilla* stem, T S of *Eichhornia* petiole, T S of Sunflower stem, T S of Sunflower leaf, T S of *Nerium* leaf, T S of *Capparis* stem.

UNIT-III: GENETICS

[A] QUANTITATIVE GENETICS/POLYGENIC INHERITANCE: Introduction (V&A 64), Characteristics of multiple genes (65), **Examples**: Kernel colour in Wheat (65), Skin colour in Man (67).

[B] LINKAGE AND CROSSING OVER: Linkage: Introduction, Coupling and Repulsion hypothesis (V&A 86) and Chromosome theory of Linkage (88). **Kinds**: Complete (88), incomplete (89) and linkage groups (90). **Crossing over**: Introduction and characteristics (92-93), Definition of mitotic and meiosis crossing over (94-95). **Kinds**: Single, Double and Multiple (98), Significance of Crossing over (104).

[C] MULTIPLE ALLELES: Introduction (V&A 115), Characters of Multiple alleles (116), Blood groups in humans (118-120), Rh factor (121), Self-sterility alleles (123-124).

Reference:

V&A: Verma P S andAgarwal V K (2006, Reprint) **Cell Biology, Genetics, Molecular Biology, Evolution and Ecology**. S. Chand & Co. Ltd, New Delhi.

Other references:

GPK: Gupta P K (2000, 3rd edition-reprint) **Genetics**. Rastogi Publications, Meerut.

PRACTICALS:

Question 5:

Genetical problems based on polygenic inheritance and multiple alleles.

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Hemchandracharya North Gujarat University, Patan

B. Sc.Semester-III Practical Examination, March/April-20

Botany Practical::PC BOT-212

[Based on: **CC-BOT-212**]

(*Plant Physiology, Plant Ecology, Genetics*)

[In force from **June 2013**]

Date: / /20 **Place:**

Time:**4 Hours**] [Maximum Marks: **50**

1. તેમને આપવામાં આવેલ દેહધાર્મવિદ્યાનો પ્રયોગ કરો. તમારા અવલોકનો કોઠામાં નોંધો અને પરીક્ષકને પરિણામ/તારણ બતાવો.

[Perform the Physiological experiment assigned to you. Tabulate your observations and show the result/conclusion to the examiner.] **10**

2. આપેલ વિસ્તાર માટે ચતુષ્કનું લઘુત્તમ કદ /ચતુષ્કની લઘુત્તમ સંખ્યા નક્કી કરો. તમારા અવલોકનો કોઠામાં નોંધો અને પરિણામ તેમજ આલેખ પરીક્ષકને બતાવો.

[Determine Minimum size of the quadrat/Minimum number of quadrat for given area. Tabulate your observations and show the result and graph to the examiner.] **8**

અથવા / **OR**

આપેલ વિસ્તારની કોઈપણ પાંચ વનસ્પતિઓની આવૃત્તિ/વિપુલતા/ઘનતા(ગીચતા)ની ગણતરી કરો. તમારા અવલોકનો નોંધો અને પરિણામ તેમજ આલેખ (આવૃત્તિ માટે) પરીક્ષકને બતાવો.

[Calculate Frequency /Abundance /Density of any five plant species of given area. Tabulate your observations and show the result and graph (for frequency) to the examiner.]

3. નમૂના **A** માંથી અકાયમી સ્લાઈડ તૈયાર કરો. નામનિર્દેશિત આકૃતિ દોરો અને તેના બાહ્ય અને આંતરિક પારિસ્થિતિકીય અનુકુલિત લાક્ષણિકતાઓ લખો. તેનો યોગ્ય પારિસ્થિતિકીય સમૂહ દર્શાવો.

[Make temporary slide from the specimen **A.** Draw labeled diagrams and write its external and internal ecological adaptive peculiarities. Mention proper ecological plant group it belongs.] **8**

4. ઓળખો અને નીચેનામાં જોવા મળતી ક્રિયા/વિશિષ્ટતાઓની ચર્ચા કરો.

[Identify and discuss process/peculiarities seen in followings]

1. પ્રયોગ **B** (નિદર્શન પ્રયોગ) [Experiment **B** (Demonstration experiment)] **3**
2. સ્લાઈડ **C** (વનસ્પતિ પરિસ્થિતિવિદ્યા). [Slide **C** (Plant Ecology).] **3**

5. નીચેનો જનીન વિદ્યાકીય કોયડો ઉકેલો અને નિર્ણય કરો.

[Solve and conclude the following genetical problem] **10**

1. બહુજનીનીક આનુવંશિકતા [Polygenic inheritance].
2. બહુવિકલ્પી જનીનો [Multiple alleles].

6. a. સબમીશન અને *મૌખિક પ્રશ્નોત્તરી.* [Submission and *viva-voce.*] **5**

b. પ્રયોગપોથી [Journal.] **3**

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B. Sc. Programme : Semester-IV

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN
Under CBCS-Semester-Grading pattern
Core Compulsory Course in BOTANY
CC-BOT-221
w.e.f. December 2013
(*Morphology and Angiosperms, Angiosperm families, Plant Anatomy*)

Theory teaching hours: 3 Hours/week **Credits: 3.0**
Practical teaching hours: 3 Hours/week **Credits: 1.5**

Unit-I :: MORPHOLOGY and ANGIOSPERMS

[A] INFLORESCENCE AND FRUITS: Special Inflorescence: Hypanthodium, Cyathium and Verticillaster (SSC 286). **Fruits**: Definition (SSC 320), True and false fruits (SSC 320), Parts of the fruit (). **Simple fruits**: **Indehiscent**: Caryopsis (SSC 322), Samara. **Dehiscent**: Capsule: Loculicidal (SSC 321), Septicidal. **Schizocarpic**: Lomentum, Regma. **Fleshy fruits:**Drupe, Berry (SSC 323). **Aggregate:** Etaerio of barriers (SSC 325). **Composite:**Sorosis (SSC 326).

[B] ANGIOSPERMS: General characters of Angiosperms. **Sun-flower** (***Helianthus***): Classification (Bentham and Hooker, 1862-80), habit-habitat, sporophyte (external structure), reproduction (inflorescence and florets) and gametophyte (except development), embryogeny (in short).

[C] Maize (*Zea mays*): Classification (Bentham and Hooker, 1862-80), habit-habitat, sporophyte (external structure), reproduction (inflorescence and flowers) and gametophyte (except development), embryogeny (in short).

References:

SSC:**Santra S C, Chatterjee T P and Das A P** (1993, 1st edition) **College Botany Practical Vol.-II.** New Central Book Agency (P) Ltd, Kolkatta.

Practicals:
Specimen **G**: Inflorescence: Hypanthodium, Cyathium and Verticillaster.
Fruit :
Specimen **H**: Caryopsis - Maize or Wheat, Samara: *Holoptelea.*Loculicidal: Cotton, Septicidal: Castor/Mustard. Lomentum: *Acacia nilotica*, Regma: *Ricinus*
Specimen **I**: Fleshy - Drupe – Mango; Berry - Tomato or Brinjal, Etaerio of berry - *Anonasquamosa*; Sorosis – Pineapple or *Morus*

Qeustion 1: Specimens A and B
Classification and Mountings of *Helianthus* - Rayfloret and discfloret, pollen grains.
Classification and Mountings of *Zea mays* – spikelet/flower, fresh material of *Zea mays* plant with male and female inflorescence.
Permanent slides of *Helianthus*and*Zea mays* - T.S. of anther, L.S. of ovule

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Under CBCS - Semester - Grading Pattern

B.Sc. :: SEMESTER-III & IV:: BOTANY

Elective Course (Subject) :: ES BOT-212

Water quality analysis

(in force from June 2012)

Teaching Hours per Week: 2 **Credits-2**

Unit-I

1. Introduction(1-6) – Definition, Types, demand, Sources
2. General impurities in water(7-9)
3. Classification of water on the basis of hardness, Incrustation and Corrosion(10-12)
4. Morphometry, Sampling of liquid system(27-29)

Unit-II

1. Physical Parameters – movement, colour, odour, temperature, transparency, turbidity (55-76)
2. Electrical conductance, Total dissolved solids, Dissolved Oxygen (77-109)
3. Biochemical Oxygen demand, Chemical Oxygen demand(110-120)
4. Bacteriological parameters – Most probable number (MPN), Fecal coliform count, *E.coli* count.(215-223)

REFERENCE:

Trivedi P R and Gurdeepraj(2005)**Environmental water and soil analysis.**Akashdeep Publishing House, New Delhi.

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Under CBCS - Semester - Grading Pattern

B.Sc. :: SEMESTER-III & IV:: BOTANY

Elective Course (Subject) :: ES BOT-213

Biodiversity

(in force from June 2012)

Teaching Hours per Week: 2 **Credits-2**

Unit-I

1. Introduction – Definition: genetic, species and ecosystem diversity
2. Bio-geographical classification of India
3. Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values
4. Biodiversity at global, national and local levels

Unit-II

1. India as a mega-diversity nation, Hot-spots of biodiversity
2. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts
3. Endangered and endemic species of India and Gujarat
4. Conservation of biodiversity: *in-situ* and *ex-situ* conservation of biodiversity

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THE END of Revised & Upgraded syllabus of

B Sc. Semester-III & IV in BOTANY

(In force from June-2013 **&** December-2013 **respectively)**

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ZOOLOGY

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

UNDERGRADUATE PROGRAMME
CBCS :: Semester :: Grading Pattern
With effect from: June 2012 (In continuation)

Faculty:Science

Subject:Zoology

SYLLABUS

SEMESTER – III & IV

Total Number of Pages: 1 to 20

Submitted on
Date: 07/04/2012

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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 chang ing 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 consider ed 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 the 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 Univ ersity/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 studen t 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 coursed (Theory) each with 3 credits and their practical's each with 1.5 credits. Thus, accredit weightage in Semester III and IV of B.Sc Programme for each core c ourse shall be of 4.5 credits. In short, 4.5 credits multiplied by 4 cores compulsory coursed 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 an d 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 × 3 cred its) 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. Student is free to write answers either in Gujarat or 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%, where as 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:

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- ► 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 followin g 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 End of semester Examination (Theory) will be conduct ed by the University. A certified journal of the respective of the respective core compulsory course shall be produced at the time of practical examination. In practical exam there will be two practical (each from PC-301 & PC-302) each of 50 marks (40 marks for practical+10 marks for Viva). Number of student in a practical exam will be 20 to 24 and examiners will be 2.
6. It will be compulsory for a candidate to obtain passing percentage in both Internal as well as External Evaluation. The passing marks for ea ch 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 examination.

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HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN
B.Sc.Programme with 144 credits
CBCS-Semester-Grading Pattern
w.e.f. June-2011

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

Particals	Course	Study component	Instruction Hrs/ week	Examination			Credit
				Internal	Uni. Exam.	Total	
B.Sc. Sem.-III	Semester-III Core Compulsory(CC) Course						
	CC-I-3	Core Course-I (paper-3)	3	30	70	100	3
	CC-I-4	Core Course-I(Paper-4)	3	30	70	100	3
	CC-II-3	Core Course-II(Paper-3	3	30	70	100	3
	CC-II-4	Core Course-II(Paper-4)	3	30	70	100	3
		Practical Core(PC) Course					
	PC-I-3	Practical Core Course-I (paper-3)	3		50	50	1.5
	PC-I-4	Practical Core Course-I (Paper-4)	3		50	50	1.5
	PC-II-3	Practical Core Course-II (Paper-3)	3		50	50	1.5
	PC-II-4	Practical Core Course-II (Paper-4)	3		50	50	1.5
	Foundation Course (FC)						
	FC-3	Foundation(Generic) Course-III Compulsory English (L.L)	2	30	70	100	2
		Elective Course (E)					
	EG-3	Elective (Generic) Course-III	2		50	50	2
	ES-3	Elective (Subject) Course-III	2		50	50	2
			30	150	650	800	24
B.Sc. Sem.-IV		Semester-IV					
	Core Compulsory(CC) Course						
	CC-I-5	Core Course-I (paper-5)	3	30	70	100	3
	CC-I-6	Core Course-I (Paper-6)	3	30	70	100	3
	CC-II-5	Core Course-II (Paper-5)	3	30	70	100	3
	CC-II-6	Core Course-II (Paper-6)	3	30	70	100	3
		Practical Core (PC) Course					
	PC-I-5	Practical Core Course-I (paper-5)	3		50	50	1.5

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	PC-I-6	**Practical Core Course-I (Paper-6)**	**3**		**50**	**50**	**1.5**
	PC-II-5	**Practical Core Course-II (Paper-5)**	**3**		**50**	**50**	**1.5**
	PC-II-6	**Practical Core Course-II (Paper-6)**	**3**		**50**	**50**	**1.5**
		Foundation Course (FC)					
	FC-3	**Foundation(Generic) Course-IV Compulsory English (L.L)**	**2**	**30**	**70**	**100**	**2**
		Elective Course (E)					
	EG-3	**Elective (Generic) Course-IV**	**2**		**50**	**50**	**2**
	ES-3	**Elective (Subject) Course-IV**	**2**		**50**	**50**	**2**
			30	**150**	**650**	**800**	**24**

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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 respective Units and Third will contain questions from both units. The details of paper format as under.

(Times: 2 hours) (Total Marks: 50)

1. a. Answer the following (Any two out o f three)	8
b. Attempt any two of following (out of three)	6
c. Attempt any three (out of five)	6.
(Short answer or objective t ype questions)	
2. a. Answer the following (Any two out of three)	8
b. Attempt any two of following (out of three)	6
c. Attempt any three (out of five)	6
(Short answer or objective type questions)	
3. Answer the following (Any ten out of twelve)	10
(MCQ type or objective type)	

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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. Each question will carry equal marks. Format of paper will be as under. In case of Q-5 only one of the style can be adopted.

Time: 3 hours **Total marks: 70**

1. a. Answer the following (Either one out of two or two out of three) 8
   b. Attempt any one (out of two) 3
   c. Attempt any three of following (three out of five) 3

2. a. Answer the following (one out of two or two out of three) 8
   b. Attempt any one (out of two) 3
   c. Attempt any three of following (three out of five) 3

3. a. Answer the following (one out of two or two out of three) 8
   b. Attempt any one (out of two) 3
   c. Attempt any three of following (three out of five) 3

4. a. Answer the following (one out of two or two out of three) 8
   b. Attempt any one (out of two) 3
   c. Attempt any three of following (three out of five) 3

5. Answer the following (Any seven out of ten) 14
   (Very short answer; fill in the blanks or objective type question)
   (At least two question from each unit)

OR

5. a. Attempt the following (two out of three) 10
   b. Attempt the any two (out of three) 04

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B.Sc. Semester-III
ZOOLOGY
Course – III
CC Z-301 (NON CHORDATA)

Credit: 3
Internal evaluation: 30 marks [5 – Attendance + 5 – Assignment/Seminar etc. + 20 Test]
External evaluation: 70 marks

UNIT-I TAXONOMY

- Primary knowledge of Taxa, Category, Rank and Lineus Hierarchy
- General characters and Classification of Higher Invertebrates up to orders;
- Classes of Annelida: Oligochaeta; Polychaeta; Hirudinaria
- Classes of Arthropoda: Onychophora; Crustacean; Myriopoda; Arachnida; Insecta
- Classes of Mollusca: Amphineura; Gastropoda; Scaphopoda; Pelecypoda Cephalopoda
- Classes of Echinodermata: Astroidea; Ophiuroidea; Echinoidea; Holothuroidea; Crinoidea
- Hemichordata:

UNIT-II TYPE STUDY

- **Leech**: General morphology and Body wall;
  Digestive system;
  Excretory system,
  Reproductive system,
  Nervous system
- **Cockroach**: General morphology,
  - Digestive system;
  - Respiratory System;
  - Reproductive system,
  - Nervous system

UNIT-III GENERAL TOPICS

- Nutrition in Protozoa
- Reproduction in Protozoa
- Spicules and Gemmule in Sponges
- Corals and Coral formation
- Parasitic adaptation in Helminthes
- Social Life in Insects

UNIT-IV ECONOMIC INVERTEBRATES

- Economic Importance of Protozoa
- Helminthes and Human diseases
- Insects as Friends and Foes
- Pharmaceuticals and Invertebrates
- Prevention and Control of Household Insects

LABORATORY COURSE - III
PC Z 301 (NON CHORDATA)

Credit: 1.5

***Classification of Higher Invertebrates up to orders** :
Annelida: Aphrodite; Sabella; Earthworm; Pontobdella
Arthropoda: Daphnia; Lobster; Julus; Grass hopper; Limulus; Spider
Mollusca: Patella; Cyprea; Aplysia; Mytilus; Loligo; Dentalium
Echinodermata: Astropecten; Opheolepis; Sand dollar; Holothuria; Antedon
Hemichordata: Balanoglosus
***Dissection of Leech** (Demonstration only):
External morphology;
Digestive system;
Reproductive system and
Nervous system
Mountings:
Jaws;
Salivary gland,
Testicular Nephridia
***Dissection of Cockroach** (Demonstration only):
External Morphology;
Digestive system;
Reproductive system and
Nervous system
Mountings: Mouthparts;
Gizzard;
Spiracles
***Study of following with Permenant slides or Specimens**
- To study spicules and Gemmules in porifera thro' Permanent slides
- To Study parasitic adaptations of Liver fluke and Tapeworm
- To Study social life of Ants and House fly

***To study Protozoans/Helminthes which cause diseases, their Symptoms and preventive measures**
Protozoan:
Entamoeba; Trypanosoma; Leishmania; Girdia; Plasmodium; Balantidium
Helminthes:
Ascaris lumbricoidus(Ascariasis); Ancylostoma (Ancylostomiasis); *Enterobium vermicularis* (Enterobiasis); *Trichinella spiralis* (Trichonosis); *Wuchereria bancrofti* (Filariasis)
***To study economically beneficial Insects/Invertebrates through specimens**.
Silkworm; Honey bee; Lac-Insect; Prawn; Pearl Oyster

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN

Practical Examination

B.Sc. Sem. III Zoology

PC Z 301 (Non Chordata)

Time: Total Marks: 50

Date:

1. **Identify the tagged organ/ organ system from the dissected animal, draw its labeled diagram and show it to examiner.** **10**
2. **Identify/Prepare a temporary mounting of _____from the dissected animal / from the given slide. Draw a labeled diagram and show it to examiner.** **05**
3. **Identify the given specimen; mention its pathogenisity, symptoms and preventive measure.** **05**
4. **Do as directed:** **15**
    1. **Identify and classify it up to order with proper reseans.**
    2. **Identify and classify it up to order with proper reseans.**
    3. **Identify and describe its economic importance.**
    4. **Identify and comment on its usefulness in the life of animal.**
    5. **Identify and describe**
5. **Viva-voce** **10**
6. **Journal** **05**

_____

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B.Sc. Semester-III
ZOOLOGY
Course-IV

CC Z 302 (APPLIED ZOOLOGY)

Credit: 3
Internal evaluation: 30 marks [5 – Attendance + 5 – Assignment/Seminar etc. + 20 Test]
External evaluation: 70 marks

UNIT-I POULTRY SCIENCE AND DAIRY INDUSTRY

-Introduction; Reproductive system of Hen; Formation and structure of egg; Types of Poultry house; Types of Poultry appliances; Poultry diseases; Poultry product; Primary knowledge of dairy industry

UNIT-II FISHERIES OF GUJARAT

-Classification of Fishes; Boats and Nets (Gears); Pomphret fishery; Pearl fishery; Prawn fishery

UNIT-III ENTOMOLOGY

-What is an Insect? Types of Mouthparts; Types of Metamorphosis; Types of damage and controlling measures of selected crop pests

-Lac culture

UNIT-IV BIOSTATITICS

-**BIOSTATITICS**: Frequency distribution; Mean; Median and Mode; class; graph/figure.

LABORATORY COURSE-IV

PC Z 202 (Applied Zoology)

Credit: 1.5

- Structure of egg of hen through model or boiled egg.
- To study reproductive system of hen through Model
- Different types of poultry house through models
- Different types of brooders and feeders through models
- Different types of Boats through models
- Different types of Nets through sample nets
- Life cycle of cockroach
- Life cycle of housefly
- Life cycle of butterfly
- Life cycle of Mosquito
- Important insect pests through specimens
- Temporary mounting of Insect mouthparts
- Calculation of examples related to Frequency distribution
- Calculation of examples related to Mean
- Calculation of examples related to Median
- Calculation of examples related to Mode

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN
Practical Examination
B.Sc. Sem. III Zoology
PC Z 302 (Applied zoology)

Time: Total Marks: 50

Date:

1. Identify the tagged part from given model or specimen, draw a labeled diagram, state the function of each tagged part and sho w it to examiner. (hen egg/reproductive system) 6
2. Prepare a temporary mounting of mouth parts of given Insect, sketch a labeled diagram and show it to examiner. 7
3. Identify life cycle of given specime n, sketch a labeled diagram and explain importance of each stage of life cycle. 5
4. Calculate Mean/Mode/Standard deviation from the given data. 5
5. Do as directed. (Specimen) 12
   a. Identify and describe its structure. (Poultry house)
   b. Identify and describe its use. (brooder/feeder)
   c. Identify and describe. (boat/net)
   d. Identify and describe its pattern of damage (Insect pest)
6. Viva voce 10
7. Journal 05

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CHEMISTRY

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Semester - 3

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN			
Programme code :	–	**Programme Name :**	B.Sc.
Faculty :	SCIENCE	**Semesters :**	III
Subject :	CHEMISTRY		
Effective from :	જૂન–૨૦૧૩ થી		

Sr.	Paper Code	Name of Paper	Credit
1	CC CH- 301	CORE COMPULSORY-CHEMISTRY-I	3
2	CC CH-302	CORE COMPULSORY-CHEMISTRY-II	3
3 OR 3	SE CH- 301A	SUBJECT ELECTIVE; ENVIRONMENTAL POLLUTION	2
	SE CH- 301B	SUBJECT ELECTIVE; CERAMICS	2
4	LC CH 301	LABORATORY COURSE-I	1.5
5	LC CH 302	LABORATORY COURSE-II	1.5

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Semester - 3

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN			
Programme code :	–	**Programme Name :**	B.Sc.
Faculty :	SCIENCE	**Semesters :**	IV
Subject :	CHEMISTRY		
Effective from :	જૂન–૨૦૧૩ થી		

Sr.	Paper Code	Name of Paper	Credit
1	CC CH-401	CORE COMPULSORY-CHEMISTRY-I	3
2	CC CH-402	CORE COMPULSORY-CHEMISTRY-II	3
3 OR	SE CH-401A	SUBJECT ELECTIVE; NAME REACTIONS	2
3	SE CH-401B	SUBJECT ELECTIVE; GREEN CHEMISTRY	2
4	LC CH 401	LABORATORY COURSE-I	1.5
5	LC CH 402	LABORATORY COURSE-II	1.5

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Semester - 3

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B.Sc. Semester: III & IV
Chemistry Syllabus
(Effective from june-2013)

This syllabus is to be completed by assigning three period of one hour each for core course, Two period of one hour each for subject Elective course. and two practicals of three hours each per week.

The number of students in a practical batch should not exceed twenty five.

PATTERN OF EXAMINATION :

There will be two papers for core compulsory and one paper for subject elective theory and five hours/day for two days per batch practicals in the university examination. The pattern will be as follows.

written	Examination	Marks External	Marks Internal
Core course-I	3 hours	70	30
Core course-II	3 hours	70	30
Subject elective course	2 hours	50	…….
Laboratory course-I	5 hours	50	……
Laboratory course-II	5 hours	50	……

Theory Examination Pattern:

Que. No : 1	(A) : Write any Two out of Three Questions (B) : Write any One out of Two Questions	14 Marks 06 Marks
Que. No : 2	(A) : Write any Two out of Three Questions (B) : Write any One out of Two Questions	14 Marks 06 Marks
Que. No : 3	(A) : Write any Two out of Three Questions (B) : Write any One out of Two Questions	14 Marks 06 Marks
Que. No : 4	Write any Ten out of Twelve (Four questions to be asked from each unit) Short question/MCQ/Short numerical/Diagram	10 Marks

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Total Marks: 70

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Semester - 3

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B.Sc.

Semester : III જૂન–૨૦૧૩ થી

Chemistry (CC CH – 301)

Unit:–I Wave Mechanics :

- Black Body Radiation & Quantum Theory.
- Photo electric effect : Wave particle duality of radiation.
- Compton effect.
- Basic postulates of quantum Mechanics.
- Operator : Definition, Algebra of operators, Addition, Multiplication, Commutative properties, Linear operator, Commutator operators, Laplassian operator.
- Free particle system.
- Particle in one dimension box.

Unit:–II Acid-Base Properties :

- Proton acids – Bases and Lewis acids - Bases.
- Scale of acidity - Basicity.
- Factors effecting on acidity and basicity of compounds.
  - Resonance effect (Drawing resonance structures and the conditions for resonance).
  - Inductive and electronic effects.
  - Effect of hybridization.
  - Steric effects.
  - Effects by hydrogen bonding.

Unit:–III Thermodynamics :

❖ **Phase in Equilibrium.**

- Clapeyron-clausius equation
- Integrated form of clapeyron-clausius equation.
- Application of clapeyron-clausius equation from various phase in equilibrium.

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- Trouton's law.
- Craft equation. જૂન–૨૦૧૩ થી
- Elevation in Boiling point.(Kb)
- Depression of freezing point. (Kf)

❖ **Partial molar Properties.**

- Partial molar free energy.
- Concept of Chemical Potential.
- Gibs-Duhem equation.
- Variation of chemical potential with temperature and pressure.
- Duhem-Margules equation.

❖ **Numericals.**

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Semester : III જૂન–૨૦૧૩ થી

Chemistry (CC CH – 302)

Unit:–I Chemistry of Noble gases :

- Introduction
- Discovery of Noble gases: Occurrence, Isolation of Non-radioactive of Noble gases.
- Electronic configuration of Noble gases.
- Compound of Noble gases.
  1) Non real compounds prepared by different methods.
  2) True compounds: XeF_2, XeF_4, XeF_6, $XeOF_2$, XeO_3, XeO_2F_2, XeO_4, $XeOF_4$.

Unit:–II

(A) Amino acids & Peptides :

❖ **Amino acids.**

- Introduction.
- Classification and nomenclature.
- Dipolar ion structure and Isoelectric point.
- Synthesis of amino acids (Grabriel Phthalimide, Straker, Fisher-Malonic ester).
- Reactions of amino acid.

❖ **Peptides.**

- Geometry of peptide linkage.
- Synthesis of peptides (Bergmann Method, Shehan Method).
- Determination of structure of peptide by terminal residue analysis.

(B) Electrophillic Aromatic Substitution :

- Introduction.
- Effect of substituent groups.

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- Determination of orientation. 02/07/2013
- Classification of substituent groups. જૂન–૨૦૧૩ થી
- Orientation in disubstitued benzenes.
- Orientation and synthesis.
- Mechanism of …Nitration, Sulfonation, Fridal - kraft alkylation and Helogenation.
- Electrophillic aromatic substitution (Two steps).
- Theory of reactivity.
- Theory of orientation.
- Electron release via resonance.

Unit:–III Physical Properties & Molecular Structure:

❖ **The Vacancy Theory of Liquid.**

- Vapor-Pressure
- Surface tension
  1) Measurement of surface tension by stalagmometer.
  2) Perachore and its applications.
- Viscosity
  1) Measurement of viscosity by Ostwald-viscometer
- Refractive index
  1) Specific refraction.
  2) Molar refraction.
  3) Measurement of Refractive index by Abbe's Refractometer.
- Optical activity
  1) Measurement of Optical activity by Polarimeter.
- Dipole moment and its measurements & its application.
- Numericals.

REF :

➢ **Inorganic Chemistry**

1. Quantum Chemistry by R.K.Prasad, Revised IIIrd Edition, Page- 3,5,7,34-37,41,65-68. જૂન–૨૦૧૩ થી

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2. Concise Inorganic Chemistry J.D.Lee, 4th edition, ELBS publication. **02/07/2013**

- **Organic Chemistry** જૂન–૨૦૧૩ થી

1. Organic Chemistry by Morrison and Boyd.4th ed. Pearson Education-2003
2. Organic Chemistry by pine, Hendriction, Cram and Hammond 4th ed. By P.S.Kalsi.
3. Advance Organic Chemistry by Jerry March.
4. Advance Organic Chemistry by Arun Bahal and B.S.Bahal.
5. Organic Chemistry Vol. I & II by S.M.Mukherji, S.P.Sing, R.P.Kapoor.
6. Reaction mechanism and Reagents in Organic Chemistry by Gurdeep R.Chatwal 4th ed. Himalaya public House.
7. Text book of Organic Chemistry by Arun Bahal, B.S.Bhal, S.Chand.
8. Organic Spectroscopy by P.S.Kalsi.
9. Organic Chemistry by I.R.Finar.

- **Physical Chemistry**

1. Advance Physical Chemistry by Gurdeep Raj
2. Physical Chemistry (Question and Answers) by R.N.Madan, G.D.Tully, S.Chand.
3. Principal of Physical Chemistry by Puri, Sharma, Pathania.
4. Chemical Thermodynamics by R.P.Rastogy and R.R.Misra.
5. Essentials of Physical Chemistry by B.S.Bahal, Arun Bahal, G.D.Tully.
6. Physical Chemistry by P.W.Atkins, 5th ed. , Oxferd, 1994, 7th ed. ,2002
7. Physical Chemistry by R.A.Alberty and R.J.Silbey, John Wiley, 1995.
8. Physical Chemistry by G.H.Barrow, 5th ed. , Mac Graw Hill, 1998, 6th ed.
9. Physical Chemistry by W.J.Moore, 4th ed. , Orient Longmans, 1969.

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Semester : III

Chemistry (SE CH – 301A) જૂન–૨૦૧૩ થી

SUBJECT ELECTIVE PAPER

(Environmental Pollution)

Unit -I

- Introduction
- Classification of pollutant
- Types of pollution
- What is air pollution
- Source of air pollution
  Acid Rain
- Emissions of major industrial air pollutant
- What is water pollution
- Types of water pollution -Physical & Chemicals,Biological and Physiological
- Source of Water Pollution

Unit-II

- What is soil pollution
- Sources of soil pollution
- Effect of Morden Agro-Technilogy on Soil
- What is Noise Pollution
- What is Thermal Pollution
- What is Radio Active Pollution
- Prevention of pollution

REF:-

1. Industrial Chemistry by B.K.Sharma.

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B.Sc.

Semester : III

Chemistry (SE CH – 301B) જૂન–૨૦૧૩ થી

SUBJECT ELECTIVE PAPER

(Ceramics)

Unit : I

❖ **Ceramics :**

- Introduction of Ceramics, History-Definition- Domestic and Industrial uses of Ceramics - Modern Ceramics - Hi-tech ceramics - Sub-division in Ceramics.
- Ceramic bodies,
- Procedures of body preparation,
- Quality testing of raw material,
- Grinding,
- Sieving and demagnetizing,
- Filter pressing,
- Dearing pug mill,
- Slip casting,
- Slip Parameters,
- Finishing,
- Glazing,
- Firing,
- Type of kiln

UNIT - II :

(A) Ceramic Properties Measurements :

- Common physical test in ceramics.
- Moisture measurement,
- Grit content,

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- Specific density,
- Water of plasticity(WOP),
- Viscosity,
- Dry shrinkage,
- Porosity,
- Water absorption,
- Fired shrinkage,
- Loss of ignition (LOI),
- Module of rapture(MOR),
- Crazing test,

02/07/2013
જૂન–૨૦૧૩ થી

(B) Refrectories :

- Classification of refrectories,
- Properties and application of refrectories,
- Manufacturing process of silica bricks.

REF :

1. Industrial ceramics -Felix singer and Sonja s. singer
2. Ceramic technology and processing - Alan G. king
3. Source book of Ceramics,Part-1 - S.kumar
4. Source book of Ceramics,Part-2 - S.kumar

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Semester: III

જૂન–૨૦૧૩ થી

Laboratory Course -I (Chemistry)

Organic Chemistry (4 hours per practical)

- Separation of Organic Mixture. (Any 7 out of 10)
  Mixture Containing Two Compounds (Only Water Insoluble Solid Compounds taken)

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Semester: III જૂન–૨૦૧૩ થી

Laboratory Course -II (Chemistry)

Physical Chemistry.(Any 7 out of 10) (4 hours per practical)

1) Conductrometric titration:- HCl / CH_3COOH Vs NaOH
2) Conductrometric titration:- HCl Vs NH_4OH
3) pH- metric titration:-
   a. Calibration of pH - meter by 4 - pH buffer
   b. HCl Vs NaOH
4) Determine the Dissociation constant of the acid of mixtures of CH_3COONa and CH_3COOH by determine the PH
5) Determine the specific refraction and molar refraction of the given liquid A, B and mixture C (A+B) and calculate the percentage composition of A and B in the mixture C by Abbe's Refractrometer.
6) Determine the molar refraction $CH_3COOC_2H_5$,$CH_3COOC_3H_7$ and $CH_3COOC_4H_9$ and show the constancy of reaction equivalent of $-CH_2$ – Group by Abbe's Refractrometer.
7) To determine the viscosity of a different mixture of liquid A and B and determine the percentage composition of unknown mixture by graphical method.
8) To determine the surface tension and compare cleaning-efficiency of two samples of a detergent or soap with stalagmo meter.
9) To study kinetic reaction of decomposition of H_2O_2 catalysis by iodine ion (Clock reaction)
10) Find the solubility and heat of solution of the given organic acid at two different temperatures

University Exam Pattern: (Two Days per Batch)

Name of Practical	Day	Marks
Lab. Course-I Organic Separation	One day (5 hours)	40+5(viva) = 45

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Lab. Course-II Physical Chemistry	One day (5 hours)	40+5(viva) = 45
	Journal	10
	Total	100

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BIO-
TECHNOLOGY

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B.Sc. Biotechnology
Semester- 3 and 4
(With Effect from June 2012)

			Exam			
		Instruction hrs week	**Internal**	**Uni. Exam**	**Total**	Credit
Semester-III						
Core Compulsory Course (CCC)						
CCC-I-3	Core Course-I (Paper-3) (Biotechnology)	3	30	70	100	3
CCC-I-4	Core Course-I (Paper-4) (Biotechnology)	3	30	70	100	3
CCC-II-3	Core Course-II (Paper-3)	3	30	70	100	3
CCC-II-4	Core Course-II I(Paper-4)	3	30	70	100	3
Practical Core Course (PCC)						
PCC-I-3	Practical Core Course-I (Paper-3) (Biotechnology)	3		50	50	1.5
PCC-I-4	Practical Core Course-I (Paper-4) (Biotechnology)	3		50	50	1.5
PCC-II-3	Practical Core Course-II (Paper-3)	3		50	50	1.5
PCC-II-4	Practical Core Course-II (Paper-4)	3		50	50	1.5
Foundation Course (FC)						
FCG-3	Foundation (Compulsory) course (Generic) - English (L.L.)	2	15	35	50	2
Elective Course (EC)						
ECG-3	Elective (Generic) Course -I	2		50	50	2
ECS-3	Elective (Subject) Course –I (Biotechnology)	2		50	50	2
		30	**135**	**615**	**750**	**24**
		Instruction hrs/weed	**Internal exam**	**Uni. Exam**	**Total**	Credit

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Semester-IV						
Core Compulsory Course (CCC)						
CCC-I-5	Core Course-I (Paper-5) (Biotechnology)	3	30	70	100	3
CCC-I-6	Core Course-I (Paper-6) (Biotechnology)	3	30	70	100	3
CCC-II-5	Core Course-II (Paper-5)	3	30	70	100	3
CCC-II-6	Core Course- II(Paper-6	3	30	70	100	3
Practical Core Course (PCC)						
PCC-I-5	Practical Core Course-I (Paper-5) (Biotechnology)	3		50	50	1.5
PCC-I-6	Practical Core Course-I (Paper-6) (Biotechnology)	3		50	50	1.5
PCC-II-5	Practical Core Course-II (Paper-)	3		50	50	1.5
PCC-II-6	Practical Core Course-II (Paper-6)	3		50	50	1.5
Foundation Course (FC)						
FCG-4	Foundation (Compulsory) course (Generic) - English (L.L.)	2	15	35	50	2
Elective Course (EC)						
ECG-4	Elective (Generic) Course - I	2		50	50	2
ECS-4	Elective (Subject) Course - I	2		50	50	2
		30	**135**	**615**	**750**	**24**

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B.Sc. Biotechnology
Semester- 3

Core compulsory Course - I Paper 3
Paper: Cellular metabolism -I

Unit-1 Bioenergetics and Thermodynamics

1. Bioenergetics: Definitions of System, universe, Enthalpy, Entropy, Endothermic and Exothermic reactions, Gibbs Free energy, Equilibrium constant & its biological significance.
2. Laws of thermodynamics, Relationship between standard free energy change, free energy change and equilibrium constant,
3. ATP as a universal energy currency of biological system s.
4. Biological oxidation: Redox reactions and Reduction potential, standard reduction potential E° Free-Energy Change

Unit-2 Basics of Enzyme

1. Enzymes: Enzyme as a biocatalyst, coenzyme, cofactor, Nomenclature and Classification of enzyme, Basic concept of enzyme substrate reaction.
2. Factor affecting on enzyme catalyze reaction
3. Overview of catalytic mechanisms of enzyme:
4. Enzyme kinetics: : M-M kinetics , Double reciprocal plot

Unit-3 Enzyme kinetics and regulation

1. Inhibition of enzyme.
2. Quaternary structure of protein: Hemoglobin
3. Regulations of enzymes - allosteric and Covalent regulation :
4. Basic concept of metabolism .

Unit-4 Glucose Metabolism

1. Glycolysis and fate of pyruvate (Alcohol and lactic acid fermentation.)
2. TCA cycle
3. Pentose phosphate pathway
4. Gluconeogenesis.

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B.Sc. Biotechnology
Semester- 3
Core compulsory Course-I Paper 4
Paper: Genetics and Analytical techniques

Unit-1 Classical genetics

1. Mendel's laws of heredity, Test cross, Complete and Incomplete dominance
2. Types of linkages, Sex linkage in drosophila & Mechanism of Crossing over
3. Multiple allele
4. Genetic interaction

Unit-2 Mutation

1. Mutagenic agents and its types
2. Chromosomal mutation: Variation in Number & Structure: Euploidy, Aneuploidy, Polyploidy, Deletion, Duplication, Inversion, Translocation, Position Effect, Centromeric & Non-centromeric breaks in chromosomes, Chromosomal Mosaics
3. Mutation at Molecular level
4. Inborn metabolic error in human

Unit-3 Spectroscopy

1. Interaction of EM radiation with matter : Overview of Electromagnetic spectrum;
2. UV-Vis spectrophotometer: Principle, Instrumentation, working and Application
3. Atomic spectroscopy: Principles and application of Atomic Absorption / Emission Spectrometer
4. Basics of IR, X-Ray diffraction and NMR and their application in biotechnology

Unit-4 Chromatography

1. Chromatography :Basic Theory of Chromatography, Partition theory and solvent extraction
2. Partition and adsorption chromatography
3. Application -Planner Chromatography, (Paper Chromatography, TLC) ,
4. Column chromatography : GC, Ion exchange, Gel exclusion, Affinity and HPLC

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B.Sc. Biotechnology

Practical Core Course (PCC-I-3 & PCC-I-4)
(Course I (Paper 3 and 4))
Semester- 3
Practical

Estimation of Protein & Sugar

1. Quantification of protein using by Biuret test
2. Quantification of protein using by Folin -Lowary assay.
3. Quantification of protein using by Bradford's method
4. Estimation of Reducing Sugar by DNSA method

Assaying of various enzymes (any three):

5. Amylases.
6. Phosphatases
7. Invertase.
8. Proteolytic enzymes.
9. Lipases

Enzyme Kinetics:

10. Effect of Substrate concentration (Determinatio n of Km and Vmax).
11. Determine temperature optima of the enzyme.
12. Effect of pH on enzyme activity.
13. Effect of enzyme concentration

Analytical techniques

14. To determine maximum absorption spectra of colored solution.
15. Paper Chromatography of Amino acids
16. TLC Chromatography of Amino acids

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B.Sc. Biotechnology
Semester- 3
Elective Course (EC)
Biotechnology(Subjective)
Paper: Biostatistics

Unit -1 Biostatistics

1. **Definition and Scope of Biostatistics**: Collection, Classification and tabulation of data and its graphical and Diagrammatic representation.
2. Types and significance of **Sampling** in Biostatistics
3. **Measure of central tendency**: Mean, Mode and median, Harmonic and geometric mean
4. **Measure of dispersion**

Unit -2 Biostatistics

1. Comparison of sample mean by **Student's "t" test**
2. Comparison of sample mean by **ANOVA**
3. Chi square analysis
4. Probability distribution: Binomial and Poisson

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B.Sc. Biotechnology
Semester- 3
Elective Course (EC)
Paper: Animal Hormones

Unit -1 Animal hormones-I

1. Definition, General Functions, Types Vertebrate Hormones :
2. **Steroid Hormones**: Ovarian hormones, Testicular hormones,
3. **Steroid Hormones**: Adrenal cortical hormones, Corpus luteal hormone
4. Amino Acid Derivatives : Thyroidal hormones, Adrenal m edullary hormones

Unit -2 Animal hormones-II

1 Peptide Hormones : Pancreatic hormones, Hypophyseal hormones, Parathyroidal hormones

2 Peptide Hormones: Gatro-intestinal tract hormones, Corpus luteal hormone

3 Parahormones or Tissue Hormones

4 Hormone from Thymus

PHYSICS

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NAAC'B' (CGPA) Accredited (State University)

U.G. (B. Sc.) Programme

CBCS :: Semester :: Grading Pattern

With effect from: June 2013 (In Continuation)

Faculty

Science

Subject

PHYSICS

REVISED SYLLABUS/SCHEME

B.Sc. Semesters- III & IV

Total Pages: **1 to 23**

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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. Keeping in view the challenges of the changed times 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 thus 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. Physics subject in the Universities/Affiliated Colleges shall offer undergraduate programme in Faculty of Science from the Academic year 2011-12.
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, a credit weight-age in Sem-III&IV of **B Sc** programme for each core course shall be of **4.5 credits**. In short, 4.5 credits multiplied by 4 core 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 weight-age 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**
   Practical Core -**PC**
2. Elective Generic - **EG**
   Elective Subject - **ES**
3. Foundation Compulsory- **FC**

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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 x 4 credits) duration. The course with **3 credits** shall be of **45 hrs** (15 weeks x 3 credits) duration. The course with **2 credits** shall be of **30 hrs** (15 weeks x 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	
24	24	24	24	24	24	**144**

The semester wise weightage of core, elective 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 of Instruction:

The Medium of Instruction shall be of **Gujarati medium**. Student is free to write answers either in **Gujarati** or **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%, where as 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 - 20Marks
   - ✓ Assignments - 05Marks
   - ✓ Attendance - 05Marks

The performance of student in each course is evaluated in terms of percentage of marks with a provision for conversion to grade points. 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.

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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 all the above components, 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 End of Semester Examination (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 two practicals (each from PC-301 & PC-302) each of 50 marks (35-marks for practical+15marks for Viva) and duration of each practical will be 4 hours (3 hours for Practical+ 1 hour for Viva). Numbers of student in a practical exam will be20 to 24 and examiners will be 2.

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.

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HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN
B.Sc. Programme with 144 credits
CBCS-Semester-Grading Pattern
w.e.f. June-2011

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

Part/Class	Course	Study Components	Instruction Hrs/ Week	Examination			Credit
				Internal	Uni. Exam	Total	
B. Sc. Sem –III		**Semester-III**					
		Core Compulsory (CC) Course					
	CC-I- 3	Core Course-I (Paper-3)	3	30	70	100	3
	CC-I- 4	Core Course-I (Paper-4)	3	30	70	100	3
	CC-II-3	Core Course-II (Paper-3)	3	30	70	100	3
	CC-II-4	Core Course-II (Paper-4)	3	30	70	100	3
		Practical Core (PC) Course					
	PC-I- 3	Practical Core Course-I (Paper-3)	3		50	50	1.5
	PC-I- 4	Practical Core Course-I (Paper-4)	3		50	50	1.5
	PC-II-3	Practical Core Course-II (Paper-3)	3		50	50	1.5
	PC-II-4	Practical Core Course-II (Paper-4)	3		50	50	1.5
		Foundation Course (FC)					
	FC-3	Foundation **(Generic)** Course – III Compulsory English (L.L.)	2	30	70	100	2
		Elective Course (E)					
	EG-3	Elective (**Generic**) Course –III	2		50	50	2
	ES-3	Elective (**Subject**) Course –III	2		50	50	2
			30	**150**	**650**	**800**	**24**
B. Sc. Sem-IV		**Semester-IV**					
		Core Compulsory (CC)Course					
	CC-I- 5	Core Course-I (Paper-5)	3	30	70	100	3
	CC-I- 6	Core Course-I (Paper-6)	3	30	70	100	3
	CC-II-5	Core Course-II (Paper-5)	3	30	70	100	3
	CC-II-6	Core Course-II (Paper-6)	3	30	70	100	3
		Practical Core (PC) Course					
	PC-I- 5	Practical Core Course-I (Paper-5)	3		50	50	1.5
	PC-I- 6	Practical Core Course-I (Paper-6)	3		50	50	1.5
	PC-II-5	Practical Core Course-II (Paper-5)	3		50	50	1.5
	PC-II-6	Practical Core Course-II (Paper-6)	3		50	50	1.5
		Foundation Course (FC)					
	FC-4	Foundation **(Generic)** Course – IV Compulsory English (L.L.)	2	30	70	100	2
		Elective Course (E)					
	EG-4	Elective (**Generic**) Course –IV	2		50	50	2
	ES-4	Elective (**Subject**) Course –IV	2		50	50	2
			30	**150**	**650**	**800**	**24**

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Hemchandracharya North Gujarat University, Patan

B.Sc. Programme (CBCS-Semester-Grading pattern)

Semester end Examination

Format for Question paper Elective Courses (Subject) in Physics

There will be three questions. First question will be from Unit - I, Second question from Unit-II, and Third question will be from both the Units. All the questions are detailed as under.

Time: 2Hrs **Total Marks: 50**

1 (a) Answer the following (Any two out of three) 08 Marks
(Theory questions)

(b) Attempt any two of following (Out of three) 06 Marks
(Theorytype **or** Application/Example/Problem)

(c) Attempt any three (Out of five) 06 Marks
(Short answer or objective type questions)

2 (a) Answer the following (Any two out of three) 08 Marks
(Theory questions)

(b) Attempt any two of following (Out of three) 06 Marks
(Theorytype **or** Application/Example/Problem)

(c) Attempt any three (Out of five) 06 Marks
(Short answer or objective type questions)

3 Answer the following (Any ten out of twelve) 10 Marks

(M.C.Q. Type **or** objective type)

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Semester end Examination

Format for Question paper Core Compulsory Courses in Physics

There will be four questions. First three questions are of 20 marks each and forth question is of 10 marks. First question will be from Unit - I, Second question from Unit-II, Third question from Unit-III, Forth question will be from all three Units. All the questions are detailed as under.

Time: 3Hrs **Total Marks: 70**

1	(a) Answer the following (Any two out of three) (Theory questions)	12 Marks
	(b) Attempt any four (Out of five) (Short answer/ objective/ MCQ type questions)	04 Marks
	(c) Attempt any one (Out of two) (Application/Example/Problem)	04 Marks
2	(a) Answer the following (Any two out of three) (Theory questions)	12 Marks
	(b) Attempt any four (Out of five) (Short answer/ objective/ MCQ type questions)	04 Marks
	(c) Attempt any one (Out of two) (Application/Example/Problem)	04 Marks
3	(a) Answer the following (Any two out of three) (Theory questions)	12 Marks
	(b) Attempt any four (Out of five) (Short answer/ objective/ MCQ type questions)	04 Marks
	(c) Attempt any one (Out of two) (Application/Example/Problem)	04 Marks
4	Answer the following (Any five out of Eight) (Short answer or objective type questions)	10 Marks

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CBCS - Semester - Grading Pattern

B.Sc. Semester-III

PHYSICS SYLLABUS

CC: PHY-301

UNIT - I

Heat and Thermodynamics:

Characteristic functions, Enthalpy (11.1), The Helmolt'z and Gibb's function (11.2),Two Mathematical Theorems (11.3), Maxwell's equations (11.4), The T-ds equations (11.5), Energy equation (11.6), The Thermal Expansivity (11.9), Compressibility (11.10), Joule-Kelvin effect (Porous plug Experiment) (12.1), Liquefaction of Gases by Joule-Kelvin effect (12.2).

Basic Reference :

Heat and Thermodynamics by Mark W. Zeemansky (5^{th} Edition)

Kinetic Theory of Gases:

Maxwell's Distribution Law of Velocities, Deduction of Maxwell – Boltzmann law , Determination of the values of constants 'a' and 'b' (6.5), Experimental Test of Maxwell's Law (6.6).

Basic Reference:

Thermodynamics and Statistical Physics by Singhal- Agarwal-Prakash Pragti Prakashan, Meerut.

Other References:

1. University Physics by Sears, Zeemansky and Young. (6^{th} Edition) Narosa Publication, New Delhi.
2. Heat Thermodynamics and Statistical Physics by Brijlal, Dr. Subrahmanyam, P.S.Hemne S.Chand.
3. Waves and Oscillations by N Subramanyam, Brijlal.

UNIT – II

Diffraction:

Distinction between Interference and diffraction (17.6), Fresnel and Fraunhoffer types of diffraction (17.7), Fraunhoffer diffraction at a double slit (18.4), Fraunhoffer diffraction at double slit (Calculus method),(18.4.1), Distinct between single slit and double slit diffraction pattern (18.4.2), Fraunhoffer diffraction at N slit (18.6 & 18.6.1), Plane diffraction grating (18.7), Theory of plane transmission grating (18.7.1), Dispersive power of Grating (18.7.7).

Basic Reference :

A text book of OPTICS by Dr. N, Subrahmanyam, Brijlal, Dr, M,N, Avadhanulu - S.Chand

.

Special theory of Relativity:

Newtonian Relativity (14.1), Michelson-Morley experiment (14.2), Special theory of relativity (14.3), Lorentz Transformation (14.4), Consequences of Lorentz Transformation (14.5)-(a) Relativity of Simultaneity (b) the Lorentz-Fitz Gerald length Contraction (c) Time Dilation, Addition of Velocities (14.6), Mass-energy relation (14.8), Space time (14.9).

Basic Reference:
Introduction to Classical Mechanics by Takwale & Puranik Tata McGraw-Hill Publication (7^{th} reprint-1986)

Other References:
1. A Text book of Light by D.N.Vasudeva - S. Chand & Co.
2. Fundamentals of Optics by Jonkin's and White
3. Optics by Ajoy Ghatak
4. Principles of Optics by B.K. Mathur
5. Concept of Modern Physics by Besier McGraw–Hill
6. Elements of Special Relativity by S.P.Singh & M.K.Bagde S. Chand & Co. New Delhi.
7. Properties of Matter by Brijlal, N.Subrahmanyam, S.Chand.

UNIT - III

Crystal Structure:

Crystalline and Amorphous Solids (1.1), Crystal Lattice and Crystal Structure (1.2), Translational Symmetry, Space, Unit Cell and Primitive Cell (1.3), Symmetry Elements in Crystals (1.4 [1.4.1 to 1.4.6]), The Seven crystal Systems (1.5), Coordination Number (1.5.1), Some importance crystal structure (1.6), Simple Cubic Structure (1.6.1), Body Centered Cubic Structure (1.6.2), Face Centered Cubic Structure (1.6.3), Wigner-Seitz Cells (1.7), Miller Indices (1.8), The spacing of a set of crystal planes (1.11).

Basic reference:
Solid State Physics By Ajay Kumar Saxena (Macmillan India Limited)

Atomic Spectra:

Franck-Hertz experiment (2.16), Critical potentials (2.17) Shortcomings of Bohr's Theory (2.19), Summerfield extension of Bohr theory (2.20)

Basic reference:
Atomic and Molecular Physics By Raj Kumar (Campus Books)

Other reference:
1.Introduction to Solid State Physics By C.Kittle (John Willey)

2.Fundamental of Solid State Physics By Saxena, Gupta, Saxena (Pragati Prakashan)
3.Elements of Solid State Physics by J.P.Srivastava(PHI).

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CBCS - Semester - Grading Pattern

B.Sc. Semester-III

PHYSICS SYLLABUS

CC: PHY-302

UNIT-I

Electrostatics in Dielectric:

Gaseous Non-Polar Dielectrics (2.11), Gaseous Polar Dielectrics (2.12), Non-Polar Liquids (2.13), Solid Dielectrics-Electrets (2.14).

Magnetostatics:

The Magnetic Potentials (4.9 – a & b), Magnetic Vector Potential due to Small Current Loop (4.12), An alternative method for finding the Vector Potential A and the Field B due to Current Loop (4.13), Magnetization (4.15), Magnetic Field Vector (4.16), Magnetic Susceptibility and Permeability (4.17), Boundary Conditions (4.18), Uniformly Magnetized Sphere in External Magnetic Field (4.19), A Comparison of Static Electric and Magnetic Fields (4.20).

Basic Reference :
Electromagnetics by B.B. Laud, New Age Int. Publisher (For Chapt. a & b)

Other Reference:
1. Electricity and Magnetism by Maharajan and Rangwala, THM
2. Electricity and Magnetism Berkeley Physics course Vol.-II by EDWARD M PURCELL, McGraw Hill Pub.

UNIT-II

Transistors Biasing and Stabilization:

Bias Stabilization (Operating point stabilization) (8.7, 8.7.1 & 8.7.2), Stability factor (8.8), Stabilization by Collector Base Resistance (8.9) Stabilization by potential divider and Emitter resistor (8.10)

Basic Transistor Amplifier:

Transistor as a four pole (9.2), h-parameters with h-parameters equivivalent circuit (9.5 complete), Grounded Emitter Circuit - Mathematical analysis using h- parameters only (9.6), Comparative Study of three types of Amplifiers (9.9).

Solid state Devices:

JFET (12.1 to 12.6), UJT (26.6, 26.6.1 to 26.6.3). .

Basic Reference :
Hand book of Electronics by Gupta & Kumar 30th Revised Edition,2002 Pragati Prakashan
Electronics andRadio Engineering by M.L. Gupta (9th Edition-2002) D Raj & Sons.(For Ch-(C))

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Other References:

1. Electronic Devices and Circuits by A.Mottershead Prentice – Hall of India.
2. Integrated Electronics by Millman & Halkias
3. Basic Electronics and Linear Circuits by N.N.Bhargava, D.C.Kulshreshtha, S.C.Gupta.

UNIT-III

Fourier series:

Introduction (7.1), Periodic functions (7.2), Application of Fourier series (7.3), Average values of a function (7.4), Fourier Co-efficient (7.5), Diriclet's conditions (7.6), Complex form of Fourier series (7.7), Perseval Theorem (7.11).

Co-ordinate Transformation:

Curvilinear Coordinates (10.6), Scale factors and basis vectors for orthogonal systems (10.7)

Basic References:

1. Mathematical method for physical sciences by M. L. Boss John Wiley Publication.

Schrodinger Equations:

A free particle in one dimension (2.1), Generalization to three dimensions (2.2), The operator correspondence and the Schrodinger equation for a particle subject to forces (2.3), Normalization and Probability Interpretation (2.4), Non-Normalizable Wave functions and Box Normalization (2.5).

Basic reference:

Quantum Mechanics by John L. Powell and Bernd Crasemann (for Arti.1.1,1.3,&1.17)
A Textbook of Quantum Mechanics By P.M.Mathews and K.Venkatesan (TMH)
(for Arti. 2.1,to 2.5)

Other reference:

1. Atomic Physics by Rajam (S. Chand New Delhi)
2. Quantum mechanics by Powell and Creaseman
3. Mathematical Physics by B.D.Gupta

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CBCS - Semester - Grading Pattern

B.Sc. Semester-III

PHYSICS SYLLABUS

PC: PHY-301

LABORATORY EXPERIMENTS

1. Coaxial Viscometer
2. To determine wave length of bright lines of mercury light using grating.
3. R.P. of Telescope
4. Searl's Goneometer. Determination of cardinal points and 'do'
5. Kundt's tube. Determination of 'y'
6. Diffraction by Adser `A' Patttetrn
7. e/k by Power Transistor

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CBCS - Semester - Grading Pattern

B.Sc. Semester-III

PHYSICS SYLLABUS

PC: PHY-302

LABORATORY EXPERIMENTS

1. Absolute value of capacity using B.G. or S.G.
2. Low resistance by method of Projection
3. Comparison of capacity (C_1/C_2) by Desauty method
4. To determine self inductance by Anderson Bridge
5. Characteristics of a C.B. Transistor (PNP)
6. Characteristics of JFET & Determination of μ, r_d, g_m
7. Construction of AND, OR, NOT Gates using NAND & NOR Universal gates.

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CBCS - Semester - Grading Pattern
List of Elective (Subject) Courses For IIIrd and IVth Sem.
(in force from June 2011)
Credits-2

1. VACUUM PUMPS, PRESSURE GUAGES AND INSTRUMENTS

2. ASTRO/ SPACE PHYSICS

3. ENERGY TECHNOLOGY

DETAIL SYLLABUS

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN
CBCS - Semester - Grading Pattern
B. Sc. :: PHYSICS :: SEMESTER-III & IV
ES PHY-04
VACUUM PUMPS, PRESSURE GUAGES AND INSTRUMENTS

UNIT-I

Vacuum Pumps, Pressure Guages:

Exhaust Pumps and their characteristics(15.1), Rotary Oil Pumps(15.2), Molecular Pump(15.3), Diffusion Pump(15.4), Other methods of Producing Low Pressures(15.5), Pressure Gauges - McLeod Guage, Pirani Guage, Thermocouple Guage, Ionization Gauge,(15.7).

Errors in measurement:

Errors of observations, Types of errors, Normal law of errors, Average, standard and probable errors, Percentage error.

UNIT-II

Optical Instruments:

Travelling Microscope, Cathetometer, and Optical bench.

Objective and Eyepiece, Kellner's Eyepiece, Huygens Eyepiece, Ramsden Eyepiece, Comparission of Ramsden Eyepiece and Huygens Eyepiece, Gauss Eyepiece, Telescopes, Refracting Astronomical Telescope, Reflecting Telescope, Newton's Telescope, Other reflecting Telescopes.

Electrical Instruments:

Moving coil Galvanometer, Ballistic Galvanometer, Calibration of Ballistic Galvanometer using different methods, Multimeters, Digital multimeter, Earphone and Headphone.

Basic Reference :

1. An Advanced Course in Practical Physics by D.Chattopadhyay, P.C. Rakshit, B.SAHA, New Central Book Ltd.

2. A text book of OPTICS by Dr. N, Subrahmanyam, Brijlal, Dr, M,N, Avadhanulu - S.Chand.(Ch-10.8 to 10.16)

3. Mechanics by D.S.Mathur **S.**Chand.(For Vacuum pumps)

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CBCS - Semester - Grading Pattern
B. Sc. :: PHYSICS :: SEMESTER-III & IV
ES PHY-05
(in force from June 2011)

ASTRO/ SPACE PHYSICS

UNIT-I

Sun and Solar Radiation:
Introduction, Astronomical background, General description of the sun, Solar structure, Sun's outer layers, Composition, Visible features on the sun, More about sun's outer atmosphere, Temperature of the corona, Solar activity and Sunspot cycles.

UNIT-II

Cosmic rays and High energy astrophysics

An introduction to cosmic rays and high energy astrophysics: primary cosmic radiation, energy spectrum of primary cosmic rays, secondary cosmic rays, effect of geomagnetic field on cosmic rays, time variation of cosmic rays, photons in primary cosmic rays, origin of cosmic rays, basic facts about cosmic rays, region of confinement

Basic Reference:
An Introductory Course on Space Science and Earth's Environment
by S.S.Degaonker (Gujarat University Publication, Ahmedabad)

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CBCS - Semester - Grading Pattern
B. Sc. :: PHYSICS :: SEMESTER-III & IV
ES PHY-06
(in force from June 2011)

ENERGY TECHNOLOGY

UNIT - I:

Introduction:

What is energy! , Energy Science and Technology, Energy, mass and environment, Some well known forms of energy, Energy Resources and forms of energy, Energy demand, Energy Routes for Conventional energy resources, National energy strategies, and energy plan, Energy management, Cost comparission of energy resources and conversion, Energy Conservation opportunities.

Environmental aspects of energy:

Introduction, Polution from use of energy, Conbustation Products of Fossil Fuels, Particulate Matter, Electrostatic Precipitator(ESP), Fabric Filter and Baghhouse.

UNIT-II

Geothermal Energy:

Introduction, Applications, Utilization of Geothermal Energy, Geothermal Energy Resources, Hydro Geothermal Resources, Hot Dry Rock Geothermal Resources. Merits and demerits of Petro-Geothermalenergy Power Plant, Geothermal Electrical Power Plants, Classification and types of Geotermal Power plants,

Wind Energy:

Introduction, Applications of Wind Energy and Historical Background, Merits and limitations of Wind energy Conversion, Nature and Origion of Wind, Wind Energy Quantom, Variables in Wind Energy Conversion systems, Wind power density, Power in wind Stream, Wind turbine Efficiency. Types of wind Turbine-Generator Units, Characteristics of wind turbine generator, Mono-blade HAWT, Twin-blade HAWT

References:

(1) Energy Technology by S.Rao and Dr. B.B. Parulekar, Khanna Pub.-1995 1st edition

(2) Solar Energy conversion, An introductory course By A. E. Dikon and J. D. Loslie

(3) Principles of Energy Conversion By Archie W. Cupl Jr.

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HOME-SCIENCE

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Subject : Introduction to Extension Education

Paper No – HSE 301

CC – 5

Objectives:

1. To enable students to understand the concept & philosophy of hom e science.
2. To study the principles of extension education.
3. To aware the students about the application of extension education.
4. To develop skill in preparing & hand line communication & instructional materials.

Unit – 1

- Meaning, importance, philosophy & objectives of Home science.
    - The linkage of home science with basic science, maths, economics, history, geography, psychology.
    - Present status of home science education.

Unit – 2

- Meaning of education.
    - Need of education.
    - Type of education.
- Extension education
    - Meaning & definition.
    - Philosophy and principles of extension education.
    - Objectives of extension education.

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Unit – 3

- Extension teaching methods.
    - Definition.
    - Types of extension teaching methods.
    - Individual contact methods.
    - Group contact method.
    - Mass group method.

Unit – 4

- Community development programme.
    - Meaning & objectives.
    - Development programme under community development programme.
- Role of community development programme in rural development.
    - Limitation of community development programme.

Unit – 5

- Communication
    - Meaning & Definition.
    - Importance of communication in extension work.
    - Scope of communication.
    - Elements of communication.
- Problems of communication.

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Subject : Housing and Space designing.

Paper No – RM 302

CC – 6

Objectives:

5. To acquired knowledge regarding importance of housing.
6. To acquired knowledge regarding housing and it's building hi – laws.
7. To provide knowledge domestic space requirement for different activities.

Content

Unit – 1 Housing.

- Need and its importance.
- Difference between home and house.
- Types of house (Structure wise).
- Factors to be considered while selecting housing.

Unit – 2 Types of plan (used in housing).

- Elevation, cross sectional, site, floor plan.
- Housing planning principles –
  Aspects, prospects, privacy, circulation, ventilation, roominess, groupness, sanitation, furniture requirement.

Unit – 3 Types of materials used in house.

- Construction materials.
- Building materials.

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- Components of house structure.

  Foundation, plintu, floor, walls, doors, windows, lintle, pa rapet, eating ect.

Unit – 4 Standards for residence.

- Area wise measurement.
- Rules and regulation for construction of building.
- Criteria for space designing.

Unit – 5 Wiring and water supply.

- Domestic wire planning.
- Domestic plumbing and gulter supply.
- Basic regulation for wiring and plumbing.

Practical

1) To study about various symbole used in house plan.
2) To study market survey of building materials.
3) To draw types of drawing used in house plan.
4) To draw different house plan.
5) To visit construction site.
6) To collect structure wise house pictures.

References

1) Housing for family living.
- Gandotra vrena.
2) The house.
3) "Kautumbic Avas Yojana"

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Subject : Human Physiology & Anatomy.

Paper No – Physio 303

CA – 5

Objectives:

4) To provide the knowledge about structure and di fferent systems and organs of the body.
5) To impart the knowledge about physiological process like digestion, absorption, excretion, trum port and uptake of nutrients.
6) To give the information about hormonal and nervous regulation of the body furetion.
7) To provide the knowledge about immune system.

Unit – 1

a) Digestive systems: Structure, funetions of various port of the digestive treat, process of digestion.
b) Circulatory system:
   Blood: composition, furetion, plasma, blood co -agulation process, blood group, hemoglobin, blood pressure, organ of circulatory, system – Heart, blood vessels, lymph, spleen.
c) Excretory system: Skin, lungs, large intestive, kidney and urinary excretory, organ – kidney, (nephron), urinary bladder, ureters, uretha etc. urine – composition, formation of urine.

Unit – 2

a) Respiratory systems – Basic anatomy and process of respiration – Transport and exchange of oxygen and carbon dioxide in the body.

b) Body fluids and electrolyte balance.
c) Endocrine gland, pituitary gland, thyroid and parathyroid gl ands – its structure, funetions and lets of langer hens.

Unit – 3

a) Reproductive system of male and female – organs, structure & funetious.
b) Skeletal system – bone, its composition, funetions and classification of various types of bones.
c) Muscular system – types of muscles, muscles co – ordination, chemical composition, physiological muscular action.

Unit – 4

a) Central nervous system – physiology of the nerve cell, nerve fiber, nerves, structure and furetious of CNS.
b) Sensory organs – eyes, ear, skin, nose, ton gue – structure, funetion.
c) Immunely – definition, importance, types of immunity, immunization, infection – types of infection, causes of infection.

Practicals

1) To study various body systems.
2) Study of blood cells (R.B.C., W.B.C.)
3) Determinations of blood hem oglobin.
4) Determinations of blood co – regulation time.
5) Determination of bleeding time of blood.
6) Blood group and Rh factor.
7) Measurement of blood pressure.
8) Measurement of pulse rate & body temperature.
9) Use of first aid box.

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Subject : Elementary Mathematics a nd Statistics.

Paper No – Math Stat 304

CA – 6

Objectives:

8) To provide knowledge about basic calculation by mathematics.
9) To impart the knowledge about statistical calculation.
10) To inform the students regarding the application of statistics in research project.

Unit – 1

a) Logarithm and stock and share.
b) Area – Rectangle, square, sphere, cylinder, cone.
   Volume – Cube, cuboids, cone, cylinder, sphere, cone.

Unit – 2

a) Simple interest and compound interest.
b) Definition and scope, importance uses of statistics.
c) Data and its theory.

Unit – 3

a) Presentation of statistical information – Frequency distribution, graphical presentation of frequency distribution – Bar graph, frequency polygon, cumulative frequency graph.
b) Types of variables – Dependent and independent variables.

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Unit – 4

a) Measures of central tendency mean, median, mode.
b) Measures of dispersion – Range, standard deviation, mean deviation.

References

- Text book of mathematics std – 8th, 9th, 10th, 11th and 12th standard.
- xO9`lk s>xo2n – leqk DRa.idipka w¸ex xah puinvisR3l g/>4 inmaR` boDR, gujrat raJy, Amdavad.
- ix9`ma> Aa>kDaxaS□a. yuinvisR3l g/>4 inmaR` boDR, gujrat raJy.

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Subject : Entrepreneurship Management.

Paper No – 305

ES – 3

Objectives:

11) To develop a positive attitude and value for entre preneurship.

12) To become aware of entrepreneurial opportunities and acquire the knowledge skill and competencies to run a business effectively.

Unit – 1

- Innovation and entrepreneurship
  Introduction, meaning and characteristics of entrepreneurship, meaning and characteristics of innovation.
- Explanation of certain terms – invention, creativity, cottage industry, tiny industry, small scale industry, ancillary industry.
- Types of innovation – innovation, entrepreneurship and socio – economic development.

Unit – 2

a) Process of entrepreneurship development.

- Introduction, factors affecting entrepreneurship conception of business enterprise, stages of entrepreneurship development, opportunities for entrepreneur in different activities.

b) Opportunities and self assessment.

- Introduction, identification of opportunities for business enterprises, types of opportunities, practical use of opportunities in business enterprise, self

assessment of entrepreneur, evaluation of available resources, new areas of business enterprise.

Unit – 3

a) Achievement motivation and entrepreneurial motivation.

- Introduction, achievement motivation, achievement motivation and entrepreneurial motivation – entrepreneurship development games.

b) Competence of entrepreneur.

- Introduction, meaning and form of competence and entrepreneurial competence, competence of entrepreneur.

Unit – 4

a) Management of industrial unit – 1.

- Introduction, definition and characteristics of management, functions of management, significance of management.

b) Management of industrial unit – 2.

- Introduction, (Marketing), definition and characteristics of marketing, market segmentation, pricing decision, direct selling, advertising, selection of media.

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Subject : Stress Management.

Paper No – SM 305

ES – 3

Objectives:

1) To understand the students about type of stress and its managerial aspects.
2) To study physiological cost of work of an individual and its ran dice.

Contents

Unit – 1 Stress – meaning and causes of stress development.

Type of stress – Physical stress.

- Mantle stress.

Unit – 2 Fatigue – types of fatigue.

Energy management.

Unit – 3 Method of physiological cost of work.

Energy cost calculation.

Unit – 4 Stress disorders and personality stress.

Life style and stress.

Remedies for removing stress.

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Subject : Methods and Materials for working with children.

Paper No – MMC 306

EG – 3

Objectives:

- Develop skills to create play materials and designing for children to students.
- To understand the significance of various creative activities and teachers role in implementing them.

Practical

- Students be encouraged to observe materials available in the locality for to making play materials.
- To observe various development of infant, toddler, early and late children by checklist.
- To prepare art activities for infancy and childhood period.
- To prepare material for sensation, gross motor activities and language activities for 6 to 24 months infants.
- To prepare material for cognitive and language development for pre scholars.
- To prepare material for creative and motor development for pre scholars.
- Learning to sign rhymes songs with actions.
- Learning story felling techniques with action and various teaching aids.
- Learning puppetry and creative drama.

References

- Blackle, Pa Mela (1972): Drama, Lond on: Mac Millan education.
- Garrestson R. (1966): Music in childhood education, New York; Meredith publishing company.

- Kaul. V. Bhatnagar, R. (1992): Early childhood education A trainer's handbook, New Delhi: NCERT.
- Swaminathan, M. (1984): Play activities for young children, New Delhi; UNICEF.

Subject : Art & Craft.

Paper No – AC 306

EG – 3

Objectives:

1) To acquire knowledge to students for various Indian arts & craft.
2) To provide knowledge regarding types of art made.
3) To acquired knowledge related to craft skill.

Contents

1) To visit any centre of exhibition related to art and craft.
2) Bandhani (Tie & dye).
3) Batik (Cold & dye).
4) Painting (Fabric and glass).
5) Printing (Stainsil, block and vegetable printing).
6) To use waste materials and made effort s for best sample.
7) To collect designs of jewelry by different materials.
8) To collect various embroidery sample.

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Subject : Guidance and Counseling.

Paper No – GC 307

FE – 3

Objectives:

4) To aware the students about basic counseling process.
5) To provide the knowledge about importance and necessity of counseling in different field.
6) To provide the knowledge about various methods of counseling.

Unit – 1

- Nature and necessity of counseling nature & concept of counseling, meaning of counseling, and characteristics of counseling goal of counseling.
- Need of counseling – counselor – types Hazards in the field of counseling in India.

Unit – 2

- Professional preparation and training for counseling – Introduction, need, reascus , selection problems of counselor, es sential qualities of good counselor, training of counselor, training methods.
- Characteristics of good counselor work of counselor and ethics for counselor.

Unit – 3

- Counseling approaches – Psychoanalytic classical psychoanalytic theory and other theories related to psychoanalytic behavioural.
- Approval and

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- Counseling process – steps, factors affecting counseling process, evaluation of counseling process.

Unit – 4

- The fields of counseling.
- Classification of counselling.
- Specific field of counselling.
- Counselling techniques & counselling skills.

References

1. Counselling theory and practice.
   George R.L. & Cristiani T.S. 4th edition – 1995.
   Allyn and Bacon, Boston, USA.
2. Theory and practice of counselling and psychotherapy.
   6th edition, 2001, Monterey Calif B ooks, cole, USA.
3. Introduction to counselling.
   W.G. Brown Publication.
4. Salah Manovignan – Dr. Somabhai T Patel, 3rd edition, U Granth Nirman Board, Ahmedabad.

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Subject : GENDER AND DEVELOPMENT.

Paper No – GD 307

FE – 3

Objectives:

To enable students to

7) Understand the role of women as partners in development.
8) Get sensitized to gender disparities / imbalances related to developmental issues.

Theory

Unit – 1 Conceptual analysis.

- Women in development, women and Development and gender approach to development. Shift from 'Welfare' approach to 'Development' and 'Empowerment' approaches implications.

Unit – 2 Manifestations of gender imbalances.

- Sex ratio, vital statistics, human resource development index.
- Adverse effects on women and their partic ipation in the development process.
- Barriers to women's access to inputs and services related to credit, legal rights, employment, equal pay and decision making.

Unit – 3 National efforts.

- National policy on women.

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- Efforts by the different ministers particularly by the department of women and child development – impact of international efforts.
- Post Beijing scenario.
- Legal provisions – Role of the national commission for women.

Unit – 4 Women at the grassroots.

- Need for emphasizing women at the grassroots, means of empowerment – changing status and role of women in the family and society.
- Factors influencing such changes bridging gender differences to share the benefits of development.
- Need for organizational support – efforts towards this.

References

- Chattarji, S.A. (1988) : Indian women's search for identity, New Delhi, Vikash Publications.
- Desai, Neera, (1986) : Indian women – change and challenge to International women's deeade.
- Status Report of Govt. of India.
- Report of the different ministries and departments.
- Natpucha Patcharee and Stephens Alexandra (1990) : Taking hold of rural life.
- Bankok, Thailand, Food and Agricultural Organization of the united nations regional office for Asia and the pacific. (RAPA)
- Black, Uaggie, (1993) : Girls and Women, A UNICEF development priority, New York, UNICEF.
- 10, UNICEF, (1995). The progress of nations.

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STATISTICS

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Choice Based Credit System (CBCS)
Syllabus for B.Sc. Semester III (Statistics)
Effective from June, 2013

CC STA- 201

Random Variable and Probability Distribution – I

HOURS: 4 / week ***CREDIT: 4*** ***EXAM HRS: 3***

Unit I: Random variable and its probability function (10 L)
Concept of Discrete and continuous Random Variable (R.V.), probability mass function, distribution function and its illustration, concept of joint probability functio n, marginal and conditional probability function. Transformation and its use in deriving distribution of two or more random variables.

Unit II: Mathematical Expectation and related terms (10 L)
- Expectation of Random Variables, properties o f expectations,
- Moments, measures of location, variation, skewness and kurtosis
- Moments in terms of expectations with interrelationship, moment generating function, cumulant generating function their properties and uses.

Unit III: Discrete Probability Distribution – I (10 L)
Bernoulli distribution,
Binomial distribution
Poisson distribution
Hyper geometric distribution
- Derivation, basic properties of these distributions – Mean, Variance, moment generating function and moments, cumulant generating function,
- Applications and examples of these distributions.

Unit IV: Continuous Probability Distribution -I (10 L)
Uniform / Rectangular Distribution
Exponential Distribution
Beta type I and type II distribution
- Derivation, basic properties of these distributions – Mean, Variance, moment generating function and moments, cumulant generating function,
- Applications and examples of these distributions.

Reference Books:

1. Hogg, R.V. and Craig, A.T. (1972): Introduction to Mathematical Statistics, Amerind Publishing Co.
2. Mood, A.M., Greybill, F.A. and Bose, D.C. (1974): Int roduction to the Theory of Statistics, McGraw Hill.
3. Mukhopadhyay, P. (1996): Mathematical Statistics, New Central Book Agency.
4. Rohtagi, V.K. (1967): An Introduction to Probability Theory and Mathematical Statistics,

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John Wiley and Sons.
5. Hoel, P.G. (1971): Introduction to Mathematical Statistics, Asia Publishing House.
6. Meyer, P.L. (1970): Introductory Probability and Statistical Applications, Addison Wesley.
7. Gupta, S.C., and Kapoor, V.K. Fundamentals of Mathematical Statistics, S ultan Chand Publications.
8. Goon, A.M., Gupta, M.K. and Das Gupta, B. (1991): Fundamentals of Statistics, Vol. I, WorldPress, Calcutta.
9. A First Course in Probability - Sheldon.M.Ross, (Mc Millian publishing Co.)
10. Introduction to Probability and Statistics for Engineers and Scientists -S.M. Ross (Elsever)

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Syllabus for B.Sc. Semester III (Statistics)
Effective from June, 2013
CC STA- 202
Mathematical Economics and Actuarial Science -I

HOURS: 4 / week ***CREDIT: 4*** ***EXAM HRS: 3***

Unit I: Index Numbers (10 L)
- Meaning, uses and Construction of index numbers
- Weighted and un weighted index number,
- Fixed and chain based index numbers
- Different formulas of calculating index numbers – Laspeyre's, Paasche's, Marshall – Edgeworth's Fisher's.
- Reversal tests for index numbers – Time and Factor reversal Tests
- Errors in index numbers
- Cost of living index number – its construction and uses
- Whole sale price index number and its application

Unit II: Demography (10 L)
- **Vital Statistics-**
- Sources of vital statistics in India, functions of vital Statistics, rates and ratios,
- Mortality rates- Crude, Age Specific and Standard Death rates
- Fertility and reproduction rates, Crude birth rates general and specific fertility rates, gross and net reproductive rates.

Unit III: Probability Models and Life Table (10 L)
Utility theory, insurance and utility theory, models for individual claims and their sums, survival function, curate future lifetime, force of mortality.
Life table and its relation with survival function, examples, assumptions for fractional ages, some analytical laws of mortality, select and ultimate tables.
Multiple life functions, joint life and last survivor status, insurance and annuity benefits through multiple life functions, evaluation for special mortality laws

Unit IV: Distribution of Income: (10 L)
- A Review. Distribution patterns and descriptive analysis. Income distribution functions: The Pareto law, Pareto –Levy law, week Pareto law, lognormal distribution (an income distribution),
- Inequality of income, Gini's coefficient
- Lorenz curve mathematically & its deviation for some well-known income distribution function.

Reference Books:
1. Goon, Gupta, Dasgupta : Fundamentals of Statistics, Vol -II, The World Press Pvt.Ltd., Calcutta 1986.
2. Parimal Mukhopadhyay : Applied Statistics, Books and Allied (P) Ltd , Kolkata,2005.

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3. Bowers N.L., Jr. H.S. Gerber, Hickan J.C.,Jons D.A., Nesbitt C.J.: Actuarial Mathematics, The Society of Actuaries, 1997.
4. Lecture Notes on Statistics in Insurance: An Introduction, Dr. Mrs. S.R.Deshmukh.
5. N.L. Bowers, H.U.Gerber, H.C. Hickman, D.A. Jones and C.J. Nesbitt, (1986).
6. Actuarial Mathematics, Society of Actuaries, Ithaca, Illinois, U.S.A. Second Edition (1997) (i) Unit 3 Chapters: 1,2,3,8,9,11, (ii) Unit 4 - Chapters: 4,5,6,7,13,14
7. Life Contingencies, Spurgeon E.T (1972), Cambridge University Press.
8. Life Contingencies, Neill, A. (1977), Heineman.
9. J.M. Henderson & R.E.Quandt : Microeconomic Theory - Mathematical Approach (1980).
10. Peter Lambert : The Distribution & Redistributi on of Income.
11. N.C. Kakwani : Income Inequality and Poverty : Methods of Estimation and Policy Applications.
12. P.A. Samuelson and W.D. Nordheus : Economics (1998).

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Choice Based Credit System (CBCS)
Syllabus for B.Sc. Semester III (Statistics)
Effective from June, 2013

STA- 203

Statistics Practical Based on CC STA-201 and CC STA-202

HOURS: 6 / week ***CREDIT: 2.5*** ***EXAM HRS: 3***

(A) Manual Practical

1. Generation of random sample from binomial and fitting of Binomial distribution.
2. Generation of random sample from Poisson and fitting of Poisson distribution.
3. Generation of random sample from exponential and fitting of exponential distribution.
4. Generation of random sample from beta I and beta II distribution.
5. Construction of index numbers. Reversal test for index numbers.
6. Construction of cost of living index numbers.
7. Calculation of mortality rates.
8. Calculation of Fertility rates and reproduction rates.
9. Construction of life tables.
10. Lorenz curve, Gini's coefficients and Pareto Law.

(B) Practical Using MS Excel

1. Generation of random sample from binomial and fitting of Binomial distribution.
2. Generation of random sample from Poisson and fitting of Po isson distribution.
3. Generation of random sample from exponential and fitting of exponential distribution.
4. Generation of random sample from beta I and beta II distribution.
5. Construction of index numbers. Reversal test for index numbers.
6. Construction of cost of living index numbers.
7. Calculation of mortality rates.
8. Calculation of Fertility rates and reproduction rates.
9. Construction of life tables.
10. Lorenz curve, Gini's coefficients and Pareto Law.

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HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN

NAAC Accreditation Grade - "B"

SYLLABUS

(As per the Guidelines of UGC)

Semester III and IV

For Graduate Degree in

GEOLOGY

(Earth Sciences)

(In force from June, 2016)

Three Years – Six Semester studies leading to
Degree of Bachelor in Science (B. Sc.)
Based on
Choice Based Credit System (CBCS)

Submitted by
Department of Geology
R. R. Mehta College of Science
Palanpur-385001

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HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN
B. Sc. SEMESTER – III

Design and Structure of Geology (Earth Sciences) UG Courses for Choice Based Credit System to be implemented from June 2016.

Units	Geology Theory	Geology Theory	Geology Practical
	GEO 201	**GEO 202**	**GEO 203**
	4 Credits	**4 Credits**	**2.5 Credits**
	Lectures per week : 4	Lectures per week : 4	Practical per week : 2 of three hours each
	Total Marks : 100	Total Marks : 100	Total Marks : 100
	Internal Marks : 30	Internal Marks : 30	Internal Marks : 30
	External Marks : 70	External Marks : 70	External Marks : 70
I	General Geology	Optical Mineralogy	Mineralogy, Crystallography, Petrology, Structural Geology Laboratory Work
II	Physical Geology, Hydrogeology	Crystallography	
III	Stratigraphy, Palaeontology	Petrology	
IV	Structural Geology, Economic Geology	Economic Geology	

Compulsory field work in a suitable geological area to study the elementary aspects of field geology either in semester III or semester IV.

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CBCS - Semester - Grading Pattern

B.Sc. GEOLOGY Theory: SEMESTER-III

(Semester end Examination)

CC GEO-201 TH: General Geology, Physical Geology, Hydrogeology, Stratigraphy, Palaeontology, Structural Geology, Economic Geology.

&

CC GEO-202 TH: Optical Mineralogy, Crystallography, Petrology, Economic Geology.

Format for Question paper Core Compulsory Courses in GEOLOGY

Time: 3Hrs **Total Marks: 70**

Part A

(Answer all questions)

1-06. Questions such as, MCQs, Fill in the blanks, Match the pairs, etc. (Each of **1** Mark) [Covering All Units]

Part B

(Answer all questions)

07-11. Very short answer type questions such as, Definition, Explain the terms, Examples etc. (Each of **2** Mark) [Covering All Units]

Part C

(Answer any Five/Eight of the following)

12-19. Short answer type questions such as, Definition, Explain the terms, examples/problems, reasons, differences, figures/diagrams, etc. (Each of **2** Marks) [Covering All Units]

Part D

(Answer any Five/Eight of the following)

20-27. Medium answer type questions such as, Short notes, figures/diagrams, examples/problems, reasons, differences, etc. (Each of **4** Marks) [Covering All Units]

Part E

(Answer any Four/Eight of the following)

28-35. Long answer type questions such as, Describe / Discuss in detail, diagrams, examples/ problems, etc. (Each of **6** Marks) [Covering All Units]

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CBCS - Semester - Grading Pattern

B.Sc. GEOLOGY Practical: SEMESTER-III

CC GEO-203 PR: Mineralogy, Crystallography, Petrology, Structural Geology Lab.

(In force from June 2016)

❖ **Study of the Physical and Optical properties of the minerals**

1) **Megascopic identification of the following common rock forming minerals:**
   Bloodstone, Flint, Opal, Beryl, Fluorite, Halite, Talc, Asbestos, Apatite, Graphite, Calcite, Dolomite, Magnesite, Baryte, Gypsum.
2) **Megascopic identification of the following common rock forming mineral (Ores):** Limonite, Ilmenite, Siderite, Chalcopyrite, and Malachyte.
3) **Microscopic identification of following minerals:**
   Hornblende, Hypersthene, Augite, Olivine, Tourmaline, Calcite, Sphene, Garnet, Apatite.

❖ **Study of the Physical properties of the rocks**

4) **Megascopic identification of the following rocks:**
   Graphic Granite, Porphyritic Granite, Pegmatite, Trachyte, Obsidian, Pumice, Slate, Schist, Gneiss.

❖ **Study of the Crystallography systems:**

5) Identification of crystal models belonging to Cubic and Tetragonal systems with their forms and indices.

❖ **Study of Structural Geology :**

6) Construction of topographic profile, geological cross sections of horizontal beds with igneous intrusions and simple geometrical exercises.

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S. Y. B. Sc.

SEMESTER III

GEOLOGY - THEORY and PRACTICALS

Course-wise detail syllabus

GEO 201 TH: General Geology, Physical Geology, Hydrogeology, Stratigraphy, Palaeontology, Structural Geology, Economic Geology.

Unit vise Course details

Unit –1 **GENERAL GEOLOGY:** Isostasy, Continental drift, Plate tectonics.

Unit –2 **Physical Geology:** Seas and Oceans – Currents, waves and tides, hypsographic curve, marine erosion and deposition.

Hydrogeology: Terminology, Ground water as a geological agent, springs, Hydrological cycle. Classification of subsurface water.

Unit – 3 **Stratigraphy:** General principles and Laws of Stratigraphy, Terminology of Stratigraphy. Geological Time scale – major divisions of earth's geologic history.

Palaeontology: Definition. Elementary ideas about origin of life, evolution and fossil record. Conditions of entombment, preservation and modes of fossilisation.

Unit – 4 **Structural Geology**: Terminology, Elevation and relief, contours, outcrops, Dip Strike. Maps, Scales – their representation on maps.

Economic Geology: Introduction to common rock forming, ore forming and industrial minerals. Important economic minerals of India and their distribution. Study of the following economic minerals with reference to India: Mica, Iron.

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GEO 202 TH: Optical Mineralogy, Crystallography, Petrology, Economic Geology.

Unit vise Course details

Unit –1 **Optical Mineralogy:** R. I. of minerals, Beck's test and its effects. Twinkling, Pleochroism, Extinction. Elementary knowledge of interference colours and twinning.

Unit –2 **Crystallography:** Crystal systems: Cubic and Tetragonal - their study with examples in details.

Unit – 3 **Petrology:** Modes of occurrence and structures of igneous rocks – detailed study.
Sedimentary rocks**:** Structures and importance of sedimentary rocks.
Metamorphic rocks**:** Structures and their Importance.

Unit – 4 **Economic Geology:** Study of the following economic minerals with reference to India: Manganese-, Chromium-, Aluminum-ores, Diamond, and Asbestos.

Reference Books:

1) Introduction to Physical Geology, A. K. Datta, Kalyani Publisher, New Delhi.
2) A Text Book of Geology, P. K. Mukerjee, World press.
3) A Text Book of Geology with Special Reference to India, G. B. Mahapatra.
4) General Geology, V. Radhakrishnan (1987), V.V.P. Publishers, Tuticorin.
5) Principles Physical Geology, Arthur Holmes (1978), ELBS.
6) Rutley's Elements of Mineralogy, H. H. Read, CBS publishers.
7) Introduction to Rock Forming Minerals, R. A. Deer, R. E. Howie and J. Zussman (1978), The English Language Book Society.
8) Elements of Optical Mineralogy, N. H. Winchel, A. N. Winchel (1968), Willey, Delhi.
9) The Principles of Petrology, G. W. Tyrell (1960), Asia Publishing House.
10) Mineral Economics, R. K. Sinha and N. L. Sharma (1981), Oxford IBH Publishers.
11) India's Mineral Resources, S. Krishnaswamy, (1979) Oxford & IBH Co.
12) Invertebrate Palaeontology, H. Woods (1982), Cambridge University Press.

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GEO 203 PR: Mineralogy, Crystallography, Petrology, Structural Geology Lab.

Course details

1) **Megascopic identification of following minerals:**

   Bloodstone, Flint, Opal, Beryl, Fluorite, Halite, Talc, Asbestos, Apatite, Graphite, Calcite, Dolomite, Magnesite, Baryte, Gypsum.

2) **Ores:**

   Limonite, Ilmenite, Siderite, Chalcopyrite, Malachyte.

3) **Microscopic identification of following minerals:**

   Hornblende, Hypersthene, Augite, Olivine, Tourmaline, Calcite, Sphene, Garnet, Apatite.

4) **Megascopic identification of following rocks:**

   Graphic Granite, Porphyritic Granite, Pegmatite, Trachyte, Obsidian, Pumice, Slate, Schist, Gneiss.

5) **Crystallography:**

   Study of typical crystal models belonging to Cubic and Tetragonal systems with their forms and indices in details.

6) **Structural Geology:**

   Construction of topographic profile, geological cross sections of horizontal beds with igneous intrusions and simple geometrical exercises.

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HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, University Road, P.O. BOX NO: 21, PATAN-384265.

N. Gujarat,INDIA.

NAAC Accreditation Grade–"A"

FACULTY OF

SCIENCE

GEOLOGY

SYLLABUS

(Effective from June-2018)

B.Sc. (Semester IIIProgramme)

The proposed new courses in Geology for undergraduate classes are reassigned in accordance to semester / CBCS / Grading system with new education policy. The new course is based on model curriculum of the university grants commission.

The medium of instruction should be Gujarati / English and the question paper should be drawn in Gujarati / English version. Students are permitted to write answer in English or Gujarati language.

Its objectives are as under:

1. To meet the growing demand of Specialization and Advanced Courses in applied science.
2. To help the colleges to update and modernize their laboratories.
3. To redesign the courses the special emphasis on local requirements, environment, to link the courses with requirements of the industries and research.
4. To prepare for National level entrance test like NET / SLET / JRF and other competitive exams.

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N. Gujarat,INDIA.

NAAC Accreditation Grade–"A"

FACULTY OF

SCIENCE

GEOLOGY

SYLLABUS

(Effective from June-2018)

Common Formula for Question Paper (Core Course)

Time: 3 Hours Total Marks: 70

Theory Examination Pattern (Core Course):

Que. No: 1	A: Write any Two out of Three Questions.	**14 Marks**
	B: Write any one out of Two Questions.	**06 Marks**
Que. No: 2	A: Write any Two out of Three Questions.	**14 Marks**
	B: Write any one out of Two Questions.	**06 Marks**
Que. No: 3	A: Write any Two out of Three Questions.	**14 Marks**
	B: Write any one out of Two Questions.	**06 Marks**
Que. No: 4	Write any Ten out of Twelve Short questions / M.C.Q / Short numerical / diagram (Three Questions to be asked from each Unit).	**10 Marks**

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NAAC Accreditation Grade–"A"

FACULTY OF

SCIENCE

GEOLOGY SYLLABUS

(Effective from June-2018)

Common Formula for Question Paper (Elective Course)

Time: 2 Hours

Total Marks: 50

TheoryExaminationPattern (Elective Course):

Que. No: 1	A: Write any two out of Three Questions. (Each of 05 marks)	**10 Marks**
Que. No: 2	A: Write any two out of Three Questions. (Each of 05 marks)	**10 Marks**
Que. No: 3	A: Write any two out of Three Questions. (Each of 05 marks)	**10 Marks**
Que. No: 4	A: Write any two out of Three Questions. (Each of 05 marks)	**10 Marks**
Que. No: 5	Write any Ten out of Twelve Short question / M.C.Q / Short numerical / diagram (Three Questions to be asked from each Unit).	**10 Marks**

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HEMCHANDRACHARYA NORTH

GUJARAT UNIVERSITY,University Road,

P.O. BOX NO: 21, PATAN-384265.

GEOLOGY

PRACTICAL

(Effective from June-2018)
GEO 301 PR-1

Common Formula for Question Paper (Practical Course)

Time: 05 Hours

Total Marks: 50

Practical Examination Pattern:

1. Identify the given Megascopic Rock sample. Give the texture, Mineral constituents and Conclusion of it. Also give the name of the Rock.

2. Identify the Megascopic Minerals. Give physical properties of it and give name of the Minerals.

3. Identify the Microscopic Mineral section. Write a microscopic properties of it. Give the name of minerals and draw a section of over the polarizer and between the crossed nicols.

4. Identify the given Crystal model and Write the Axial ratio, System, Symmetry, Class, Type, Combination forms and Mineral name.

5. Viva-voce.

6. Journal Work.

I/c. Registrar
Hemchandracharya
North Gujarat University
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GEOLOGY

PRACTICAL

(Effective from June-2018)
GEO 302 PR-2

Common Formula for Question Paper (Practical Course)

Time: 05 Hours

Total Marks: 50

Practical Examination Pattern:

1. Draw a given map section and write a description of it.
2. Viva-voce.
3. Journal Work.

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B. Sc. Semester – III

Design and Structure of Geology (Earth Sciences) UG Courses for Choice Based Credit System to be implemented from June 201 8.

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN						
B. Sc. Three year (General) Programme with 144 credits Semester -III and IV in **GEOLOGY** from June-2018						
General pattern/scheme of study components along with credits						
Study Components		**Instru. Hrs/ Week**	**Examination**			**Credits**
			Internal Marks	**UNi. Exam. Marks**	**Total Marks**	
Semester - III						
	Core Compulsory (CC) Course					
GEO 301	General & Physical Geology, Stratigraphy, Palaeontology and Economic Geology	3	30	70	100	3
GEO 302	Optical Mineralogy, Crystallography, Petrology, Economic Geology.	3	30	70	100	3
CC-III-3	Core Course	3	30	70	100	3
CC-IV-3	Core Course	3	30	70	100	3
	Practical core (PC) Course					
GEO 301 PR-1	Mineralogy, Crystallography, Petrology, Structural Geology Lab.	3		50	50	1.5
GEO 302PR-2	Structural geology Lab	3		50	50	1.5
PC-III-3	Practical Core Course	3		50	50	1.5
PC-IV-3	Practical Core Course	3		50	50	1.5
	Foundation Course (FC)					
FG	Compulsory English (L.L.)	3	30	70	100	2
	Elective Course (EC)					
EG	Elective (Generic) Course	2		50	50	2
GEO 303(CSE)	Elective (Geology) Course-Mineral Resources	2		50	50	2
		30	**150**	**650**	**800**	**24**

Compulsory field work in a suitable geological area to study the elementary aspects of field geology either in semester III or semester IV.

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B.Sc. Semester III

GEOLOGY - THEORY and PRACTICALS

Course-wise detail syllabus

GEO 301: General Geology, Physical Geology, Hydrogeology, Stratigraphy, Palaeontology, Structural Geology, Economic Geology.

Unit	Course details
Unit –1	**General Geology:** Isostasy, Continental drift, Plate tectonics. **Physical Geology:** Seas and Oceans – Currents, waves and tides, hypsographic curve, marine erosion and deposition. **Hydrogeology:** Terminology, Ground water as a geological agent, springs, Hydrological cycle. Classification of subsurface water.
Unit – 2	**Stratigraphy:** General principles and Laws of Stratigraphy, Terminology of stratigraphy. Geological Time scale – major divisions of earth's geologic history. **Palaeontology:** Definition. Elementary ideas about origin of life, evolution and fossil record. Conditions of entombment, preservation and modes of fossilisation.
Unit – 3	**Structural Geology**: Terminology, Elevation and relief, contours, outcrops, Dip Strike. Maps, Scales – their representation on maps. **Economic Geology** : Introduction to common rock forming, ore forming and industrial minerals. Important economic minerals of India and their distribution. Study of the following economic minerals with reference to India: Mica,Iron.

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GEO 302: Optical Mineralogy, Crystallography, Petrology, Economic Geology.

Unit	Course details
Unit –1	**Optical Mineralogy:** R. I. of minerals, Beck's test and its effects. Twinkling, Pleochroism, Extinction. Elementary knowledge of interference colours and twinning. **Crystallography:** Crystal systems: Cubic and Tetragonal - their study with examples in details.
Unit – 2	**Petrology:** Modes of occurrence and structures of igneous rocks – detailed study. Sedimentary rocks**:** Structures and importance of sedimentary rocks. Metamorphic rocks**:** Structures and their Importance.
Unit – 3	**Economic Geology:** Study of the following economic minerals with reference to India : Manganese-, Chromium-, Aluminium-ores, Diamond, Asbestos.

Reference Books:

1) Introduction to Physical Geology, A. K. Datta, Kalyani Publisher, NewDelhi.
2) A Text Book of Geology, P. K. Mukerjee, Worldpress.
3) A Text Book of Geology with Special Reference to India, G. B.Mahapatra.
4) General Geology, V. Radhakrishnan (1987), V.V.P. Publishers,Tuticorin.
5) Principles Physical Geology, Arthur Holmes (1978),ELBS.
6) Rutley's Elements of Mineralogy, H. H. Read, CBSpublishers.
7) Introduction to Rock Forming Minerals, R. A. Deer, R. E. Howie and J. Zussman (1978), The English Language BookSociety.
8) Elements of Optical Mineralogy, N. H. Winchel, A. N. Winchel (1968), Willey, Delhi.
9) The Principles of Petrology, G. W. Tyrell (1960), Asia PublishingHouse.
10) Mineral Economics, R. K. Sinha and N. L. Sharma (1981), Oxford IBH Publishers.
11) India's Mineral Resources, S. Krishnaswamy, (1979) Oxford & IBHCo.
12) Invertebrate Palaeontology, H. Woods (1982), Cambridge University Press.

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GEO 303 (CSE): Mineral Resources

Unit	Coursedetails	Credits
Unit–1	History of Geologic economic resources, Major mineral resources of India	**1**
Unit–2	Mineral resources of Gujarat	**1**

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GEO 301 PR - 1: Mineralogy, Crystallography, Petrology, Structural Geology Lab.

Course details
Megascopic identification of following minerals: Bloodstone, Flint, Opal, Beryl, Fluorite, Halite, Talc, Asbestos, Apatite, Graphite, Calcite, Dolomite, Magnesite, Baryte, Gypsum. **Ores:** Limonite, Ilmenite, Siderite, Chalcopyrite, Malachyte. **Microscopic identification of following minerals:** Hornblende, Hypersthene, Augite, Olivine, Tourmaline, Calcite, Sphene, Garnet, Apatite. **Megascopic identification of following rocks:** Graphic Granite, Porphyritic Granite, Pegmatite, Trachyte, Obsidian, Pumice, Slate, Schist, Gneiss. **Crystallography:** Study of typical crystal models belonging to Cubic and Tetragonal systems with their forms and indices in details.

GEO 302 PR - 2: Structural Geology Lab.

Course details
Structural Geology – Construction of topographic profile, geological cross sections of horizontal beds with igneous intrusions and simple geometrical exercises.

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