MATHEMATICS

I/c. Registrar
Hemchandracharya
North Gujarat University
PATAN

PROGRAM CODE : HNGU1054

Mathematic Seme ter V

CCou e: CC MATH 501 (Group Theory)

UNIT : 1 Definition of a Group and illustrations, Elementary property of a Group, Equivalent definitions of a Group, Generalized form of Associative Law, Finite Groups and their tables, Definition of a Subgroup and illustrations, Lagranges theorem and its applications.

UNIT : 2 Definition of a Permutation and illustrations, Transpositions and cycle, definition of a Normal subgroup and illustrations, Quotient group, Definition of an isomorphism of a group and its illustrations.

UNIT : 3 Properties of a cycle groups, Isomorphism of cyclic groups, Subgroup of a cycle group, Generator of a cycle group, Definition of a Homomorphism and its illustrations, Kernel of Homomorphism, Cayley's Theorem, Isomorphism of group, Groups of order four and six.

The course is covered by the Book : **I H Sheth, *Abstarct Algebra*, Prentice Hall of India (PHI) Publication.** Chapter 6(6.1 to 6.7), Chapter 7(7.1 to 7.3), Chapter 8(8.1 to 8.3), Chapter 9(9.1 to 9.3), Chapter 10(10.1 to 10.2), Chapter 11(11.1 to 11.5), Chapter 12(12.1 to 12.6)

Reference books :

1. I N Herstein, ***Topics in Algebra,*** Wiley Eastern Ltd.
2. N. Jacobson, ***Basic Algebra Vol I & II,*** Hindustan Publishing company
3. Shanti Narayan, ***A text book of Modern Algebra,*** S. Chand & Co.
4. P.B.Bhattacharya, S.K.Jain, S R Nagpal, ***Basics Abstract Algebra, (second Edition),*** Cambridge University Press.
5. N.S. Gopalkrishna, ***University Algebra,*** Wiley Eastern, New Delhi
6. Maclane Saunders and Birkhoff Garrett, ***Algebra,*** MacMillan, New York.
7. G.F.Simmons, ***Introduction to Topology and Modern Analysis,*** MacGrawHill Inc., U.S.A.

Course: CC MATH-502 Mathematical Analysis-I

Unit-1 **Number System:** The real field to be developed by ordered set approach, Equivalence of this approach and Dedikind's approach, Extended real number system, The complex number system, Euclidean spaces.

Unit-2 **Basic Topology:** Finite, Countable and Uncountable sets, Metric space, Neighborhoods in metric spaces, Limit point of a set, Open, Closed, Bounded, Compact, Perfect, Connected and Convex subsets of metric spaces.

Unit-3 **Sequences and Series:** Convergence sequence, Sub sequences, Cauchy sequences, Upper and lower limits, Special sequences and Series, Series of non negative terms, Roots and Ratio Test. Power Series with Real (Complex) terms, Interval (circle) of convergence and radius of convergence of a power series, Summation by parts, absolute convergence, addition and multiplication of series. The course is roughly covered by Chapters 1,2,3 (Omit 3.52 to 3.55) of The book entitled "Principles of Mathematical Analysis" by Walter Rudin, McGraw Hill (International Student Edition), 3rd Edition.

Reference books:

(1) “A First Course in Mathematical Analysis” by D. Somasundaram & B. Choudhary, Narosa Publishing House
(2) “Fundamentals of Mathematical Analysis” by G. Das & S. Pattnayak Tata Mcgraw Hill Pub.Co
(3) “Fundamental of Real Analysis” by S. L. Gupta & Nisha Rani – Vikas Pub. House Pvt. Ltd. New Delhi-1974.
(4) “Principle of Real Analysis “by S.C.Malik , Wiley Eastern Limited New Delhi 1982.
(5) “bhucl iv6ey” . Aem.DI.su4ar .yuin.g/>4 inmaR` bORd.Amdavad
(6) “Principle of Mathematical Analysis” by T.M.Apostol

Course : CC MATH-503 [DIFFERENTIAL EQUATIONS]

Unit:1 Formation of Differential Equations, Symbolic Operator, Method of finding C.F., Sybolic Operator 1/f(D), Method of finding P.I., Shorter method of finding P.I., To find P.I. when $X=e^{ax}$, where a is constant, To finding P.I. when X=Cosax or Sinax, To find the value of $1/f(D).x^m$, where m is positive integer, To find the value of $1/f(D).(e^{ax}V)$, where a is constant and V is a function of x. To evaluate 1/f(D).(XV), where V is a function of x. (Chapter:4)

Unit:2 Condition of Exactness of the linear differential equations, Solution of non-linear equations which are Exact, Equations of the form $y^{(n)}=f(x)$, Equations of the form $y^{(2)}=f(y)$, Equation do not contain y directly, Equation that do not contain x directly, Equation in which y appears in only two derivatives whose orders differ by two, Equation in which y appears in only two derivatives whose order differ by unity.(Chapter:6)

Unit:3 Method of solving $y^{(2)}+Py^{(1)}+Qy=R$ when an integral included in the C.F. is known, Method of solving $y^{(2)}+Py^{(1)}+Qy=R$ by changing the dependent variable, $y^{(2)}+Py^{(1)}+Qy=R$ by changing the independent variable, Solution by factorization of the Operator, Method of variation of Parameters, Method of Undetermined Co-efficient.(Chapter:7)

The course is covered by “A text book of Differential Equations”, by N.M.Kapoor, Pitamber publication, New Delhi.

REFERENCE BOOKS:

1. Erwin Kreyszing, Advanced Engineering mathematics, By. John Wiley & Sons Inc. New York, 1999.
2. D.A.Murray, Introductory course on Differential Equations, By. Orient Longman,(India), 1967.
3. A.R.Forsyth, A Terastise on Differential Equations, Macmillan and Co.Ltd., London.
4.Ian N. Sneddon, Elements of partial Differential Equations, McGraw-Hill Book Compony, 1998.
5. Fracis B. Hilderbrand, Advanced Calculus for Application, Prentice Hall of India Pvt. Ltd., New Delhi, 1977.
6. Jane Cronin, Differential Equations, Marcel Dekkar, 1994.
7. Frank Ayres, Theory and Problems of Differential Equations, McGraw-Hill Book Compony, 1972.

Mathematics : CC MATH-504 A BOOLEAN ALGEBRA

UNIT:1 Relations ,Equivalence Relation,Equivalance classes or sets,Partial order Relations,Hasse Diagram,Upper and Lower Bounds,Minimal and Maximal elements ,Binary operations,closure operations,Partially Ordered Set,Totally Ordered Set,Lattices as Posets,Dual Lattice,Meet and Join,Lattide as an algebraic

structure,Direct Product Of two Lattices,Lattice Homomorphism,Lattice Isomorphism.

UNIT:2 Sub-Lattice,Completed Lattice,Bounded Lattice,Distributive Lattice,Square Free Lattice,Complemented Lattice,Modular Lattice,De Morgan's Law,BooleanAlgebra,Boolean Algebra of Switching Circuits,Sub Boolean Algebra,Homomorphism and Isomorphism of Boolean Algebras,Atoms,Unique representation Theorem,Properties Of Set of Atoms,Stone's representation Theorem.

UNIT:3 Boolean Variables,Boolean Expression,Min term,Maxterm,Representation of Boolean Expression as a sum of Product Cannonical Form and as aProduct of Sum Cannonical Fofm,Boolean Function Associated With Boolean Expression,Symmetric Boolean Expression,Represantation of Boolean Functions And Minimization of Boolean Expression:Using Truth Table,Cube array Method,Karnaugh's Method,Circuit Diagrams.

REFERENCE BOOKS:

1.An Introduction To Discrete Mathematics -Udayan M.Prajapati, Dr.Ajay S. Gor, Nirav Prakashan
2.Discrete Mathematical Structures With Applications to Computer Science by Trembley I.P.AndMahonar R.
3.Discrete Mathematical Structures With applications to Computer Science by R.Hamming and E.A.Feigenbaum
4.Discrete Mathematical Structures for Computer Science by B.Kolman and R.C.Busy
5.The Essence of Discrete Mathematics by Neville Dean

Course : CC MATH-504 B Mechanics-I

UNIT-1 Method of Plane Statics:Fundamental for Newtonian Mechanics, Scalar field, Gradient Vector, Equilibrium of a particle and system of particles.

UNIT- 2 Necessary and Sufficient conditions for Equilibrium, Equipollent system of forces. Reduction of general force system. Principles of virtual work and potential energy.

UNIT-3 Mass centre of system of particles, Potential energy, Friction, Flexible Cables.

REFERENCE BOOKS :

1. Synge and Griffith: Principal of Mechanics
2. S.L.Loney : Statics,Macmillan and company, London.
3. R.S.Verma : A Text book on Statics,Pothishala Pvt. Ltd., Allahabad.
4. S.L.Loney : An elementary treatise on the Dynamics of a particle and rigid bodies.,Cambridge University press 1956.

5 Mechanics : Dr. L.K.Patel.

Mathematics : CC MATH-504 C OPERATIONS RESEARCH - I

Unit-1. Introduction: Nature and scope of Operations Research.
Linear programming: (a) LP Model and method of solution- Graphical method, Slack-Surplus and unrestricted variables, Simplex Algorithm, Simplex Method.

Unit-2 . Artificial Slack variables, Two phase method, Big-M / Penalty method, Variation in simplex method solution- unbounded, infeasible solutions and concept of degeneracy.

Unit-3. (a) **Duality Theory**-
The essence of duality theory, primal-dual relationships, Duality theorems, Dual simplex method.
(b) Integer Programming- The need of integer solutions, The concept of the

Cutting – Plane, Gomory's Cutting Plane Algorithm.

REFERENCES BOOKS:

(1) Operations Research , by. J.K.Sharma. Macmillan Publishers India Ltd.
(2) Operations Research by Nita Shah, Ravi Gor and Hardik Soni, Prentice Hall of India.

(3) Operations Research(Principles and Practice) by Pradeep Prabhakar Pai, Oxford University Press.

Course: PC MATH-501-504

Objectives:

- Understand the MATLAB Desktop, Command window and the Graph Window
- Be able to do simple and complex calculation using MATLAB
- Understand the graphics capabilities of MATLAB
- Be able to carry out mathematical computations using MATLAB Symbolic Toolbox

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PCMAT-501 Introduction to MATLAB

Starting and ending MATLAB session, MATLAB environment, MATLAB help, types of files, search path, some useful MATLAB commands, data types, constant and variables, operators, built-in functions, assignment statement, illustrative programs.

Vectors and Matrices Scalars and vectors, entering data in matrices, line continuation, matrix subscripts/indices, multi-dimensional matrices and arrays, matrix manipulations, generation of special matrices, useful commands, matrix and array operations, function with array inputs.

PCMAT-502 Polynomials

Entering a polynomial, polynomial evaluation, roots of a polynomial, polynomial operations - addition and subtraction, multiplication, division, formulation of polynomial equation, characteristic polynomial of a matrix, polynomial differentiation, integration, and curve fitting, evaluation of polynomial with matrix arguments.

PCMAT-503 MATLAB Graphics:

Two-dimensional plots, multiple plots, style options, legend command, subplots, specialized two-dimensional plots, three-dimensional plots.

PCMAT-504 Symbolic Processing With MATLAB

Symbolic Expressions and Algebra, Algebraic and Transcendental Equations, Calculus, Symbolic Linear Algebra, ordinary and partial differential equation, Symbolic Tutors.

Text Book:

1. "MATLAB and its Applications in Engineering" Raj Kumar Bansal, Ashok Kumar Goel, Manoj Kumar Sharma, Pearson.

coverage from the Text Book:

PCMAT-501 Chapter 1: 1.8, Chapter 2: 2.9 Chapter 3: 3.11
PCMAT-502 Chapter 4: 4.13
PCMAT-503 Chapter 6: 6.8
PCMAT-504 Chapter 9: 9.3 only. Additional commands for symbolic toolbox are to be covered from the list given below.

Symbolic Math Toolbox

Functions for Creating and Evaluating Symbolic Expressions	
Class	Returns the class of an expression.
Digits	Sets the number of decimal digits used to do variable precision arithmetic.
Double	Converts an expression to numeric form.
Ezplot	Generates a plot of a symbolic expression.
ezplot3	3-D parametric plot
Ezpolar	plot a 2-D curve in polar coordinates
Findsym	Finds the symbolic variables in a symbolic expression.
numden	Returns the numerator and denominator of an expression.
Sym	Creates a symbolic variable.
Syms	Creates one or more symbolic variables.
Vpa	Sets the number of digits used to evaluate expressions.
Functions for Manipulating Symbolic Expressions	
Collect	Collects coefficients of like powers in an expression.
Expand	Expands an expression by carrying out jpowers.
Factor	Factors an expression.
poly2sym	Converts a polynomial coefficient vector to a symbolic polynomial.
Pretty	Displays an expression in a form that resembles typeset mathematics.
Simple	Searches for the shortest form of an expression.
Simplify	Simplifies an expression using Maple's simplification rules.
Subs	Substitutes variables or expressions.
sym2poly	Converts an expression to a polynomial coefficient vector.
Symbolic Calculus Functions	
Diff	Returns the derivative of an expression.
jacobian	Compute the Jacobian matrix.
Dirac	Dirac delta function (unit impulse).
Heaviside	Heaviside function (unit step).
Int	Returns the integral of an expression.
Limit	Returns the limit of an expression.
symsum	Returns the symbolic summation of an expression.
Taylor	Returns the Taylor series of a function.

Symbolic Linear Algebra Functions	
Det	Returns the determinant of a matrix.
Eig	Returns the eigenvalues (characteristic roots) of a matrix.
Inv	Returns the inverse of a matrix.
Poly	Returns the characteristic polynomial of a matrix.
Symbolic Tutors	
Arclen	Find the arclength of the curve.
composefun	compose two functions
dirdifftool	plot or animate directional derivatives
Eigtool	interactive matrix eigenvalues
gradtool	plot or animate gradient(s)
Linsys	plot a system of 2-D or 3-D linear equations
Ratfun	demonstrate the graphing of rational functions
Rsums	Riemann sum approximate integration tutor
taylortool	taylor approximation tutor

Assignment: The student should submit the electronic copy of diary file showing the execution/output of Matlab session(s).

N.B.: 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:

5. **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.**
6. **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.**
7. Use also "PYTHON" Software instead of MATLAB Software.
8. ***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.
(ii) One Peon for computer laboratory.

Subject Elective Course :ESMAT-31 Business Mathematics-III

Unit:1 [Differential Calculus] [only examples] Definition of differentiation in one variable, Working rules of differentiation, Derivative of x^n, logx, e^x, a^x, trigonometric functions and inverse trigo. Functions, Differentiation of method of substation and implicit function, parametric equations, Diff. of $f(x)^{g(x)}$.

Unit:2 [Integral Calculus] [only examples] Indefinite integral: Definition, Working rules of integration, integration of x^n, a^x, e^x, integration of $\frac{1}{x^2 \pm a^2}; \frac{1}{\sqrt{x^2 \pm a^2}}; \frac{1}{\sqrt{a^2 - x^2}}; \frac{1}{|x|\sqrt{x^2 - a^2}}$ integration of trigonometric functions , integration by method of substitution, **Some standard results:** $\int f(x)dx = F(x) + c \Rightarrow \int f(ax+b)dx = \frac{1}{a}F(ax+b) + c$, $\int [f(x)]^n . f'(x)dx$,

$\int \frac{f'(x)}{f(x)}dx$, $\int \frac{1}{ax^2+bx+c}dx$, $\int \frac{1}{\sqrt{ax^2+bx+c}}dx$.

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.
(3) Any Advance Calculusbooks used in Science Streme .

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HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY
PATAN - 384 265
NAAC Accreditation Grade - "B"

FACULTY OF SCIENCE

B. Sc. Programme in BOTANY subject

Under CBCS :: Semester :: Grading Pattern

Syllabus and Examination Scheme for

Semesters V and VI

With effect from

June 2013 and December 2013

respectively

Date: 25/03/2012

Total Pages: **1 to 38**

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Syllabus for
B. Sc. (Semester **V** and **VI**) **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*	***04*** *(in each semester)*
✓ *Credits per CC course*	*03*
✓ *Total credits for CC course*	***12****/Semester*
✓ *Theory lectures per CC course*	*03 / Week*
✓ *Total Theory lectures for CC course*	*12 / Week*
✓ No. of Practical courses per semester	**04** (**each from CC course**)
✓ Practical lectures	03 /*Week*/course/batch
✓ Total Practical lectures	12 / *Week*/ batch
✓ Credits per Practical course	**1.5**
✓ Total Credits of Practical course	**06** /Semester
✓ No. of Practical course (***in Uni. Exam.***)	**03** /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	**15**(on approval of AC and Exam. unit)

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Under Choice **B**ased **C**redit **S**ystem-Semester-Grading System pattern
B. Sc. Programme in Botany
Semester-V and VI

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 (11 th Plan, March 2009) and later on the Association of Indian Universities (AIU) stressed on the following rec ommendations:

- 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 **BotanySemester V and VI** shall be offered from the Academic year **June 2013 and December 2013**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 four**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 **18 credits**. In short, **4.5** credits multiplied by **4** 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**.

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 **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 s hall 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…	5 marks and
Attendance, Regularity, Punctuality…	5 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. 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.

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 /studyplant 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-V and VI a common list of three courses is given below. Students are requested to select any one of three courses in Semester-V and then in Semester-VI one course may be selected from the rest of the two courses.

1. ES BOT-301**::** ***Pharmacognosy of Herbal Drugs***
2. ES BOT-302 **::** ***Fresh Water Ecology***
3. ES BOT-303 **::** ***Air Pollution***

Selection of Elective (Generic) course:

For all Semesters-I to VI a separate list consists of new courses of **Elective (Generic)** is given by the Universityin Paripatra Kramank: 172/2012. Students may select **any one** of the courses as mentioned below forSemester-V and VI separately.As per Paripatra in Semester-V there are **two c**ourses 1. **Indian constitution** and 2. **Data Base Management System** (DBMS). In Semester-VI there are **two c**ourses 1. **Information Technology** and 2. **Naturopathy**.

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN						
B.Sc. three year (General) Programme with 144 credits Semester-V and VI in **BOTANY** w.e.f. June-2013 and December-2013 respectively						
General Pattern/Scheme of study components along with credits						
Study Components		**Ins. Hrs/ Week**	**Examination**			**Credits**
			Internal Marks	**Uni. Exam. Marks**	**Total Marks**	
Semester-V						
	Core Compulsory (CC) Course					
CC-I-7	Core Course-I (Paper-7)	3	30	70	100	3
CC-I-8	Core Course-I (Paper-8)	3	30	70	100	3
CC-I-9	Core Course-II (Paper-9)	3	30	70	100	3
CC-I-10	Core Course-II (Paper-10)	3	30	70	100	3
	Soft-skill: Practical Core (PC) Course					
PC-I-7	Practical Core Course-I (Paper-7)	3		50	50	1.5
PC-I-8	Practical Core Course-I (Paper-8)	3		50	50	1.5
PC-I-9	Practical Core Course-II (Paper-9)	3		50	50	1.5
PC-I-10	Practical Core Course-II (Paper-10)	3		50	50	1.5
	Foundation Course (FC)					
FG-31	Compulsory English (L.L.)	3	30	70	100	2
	Elective Course (EC)					
EG-31	Elective (Generic) Course	2		50	50	2
ES-31	Elective (Subject) Course	2		50	50	2
		30	**150**	**650**	**800**	**24**
Semester-VI						
	Core Compulsory (CC) Course					
CC-I-11	Core Course-I (Paper-11)	3	30	70	100	3
CC-I-12	Core Course-I (Paper-12)	3	30	70	100	3
CC-I-13	Core Course-II (Paper-13)	3	30	70	100	3
CC-I-14	Core Course-II (Paper-14)	3	30	70	100	3
	Soft-skill: Practical Core (PC) Course					
PC-I-11	Practical Core Course-I (Paper-11)	3		50	50	1.5
PC-I-12	Practical Core Course-I (Paper-12)	3		50	50	1.5
PC-I-13	Practical Core Course-II (Paper-13)	3		50	50	1.5
PC-I-14	Practical Core Course-II (Paper-14)	3		50	50	1.5
	Foundation Course (FC)					
FG-32	Compulsory English (L.L.)	3	30	70	100	2
	Elective Course (EC)					
EG-32	Elective (Generic) Course	2		50	50	2
ES-32	Elective (Subject) Course	2		50	50	2
		30	**150**	**650**	**800**	**24**

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Under CBCS-Semester-Grading pattern

B. Sc. (Semester-V and VI) Programme

Format for Question paper

Core Complementary Course in Botany

Time: **3 Hours** **[w. e. f. June 2013 and December 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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HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN
Under CBCS-Semester-Grading pattern

B. Sc. (Semester-V and VI) Programme

Format for Question paper

Elective (Subject) Course in Botany

Time: **2 Hours** **[w. e. f. June 2013 and December 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-V :: BOTANY:: Core Compulsory

For Semester-end examination there will be
FOUR theory and
THREE practical courses
as mentioned below:

CORE COMPULSORY COURSE

CC-BOT-311
(*Algae, Fungi and Plant Pathology*)

CC-BOT-312
(*Bryophyta, Pteridophyta and Gymnosperms*)

CC-BOT-313
(*Angiosperm Families, Plant Ecology and Plant Anatomy*)

CC-BOT-314
(*Cell Biology & Genetics, Microbiology and Biostatistics*)

CORE COMPULSORY PRACTICAL COURSE

PC-BOT-311
(*Algae, Fungi, Plant PathologyandBryophyta*)

PC-BOT-312
(*Pteridophyta, Gymnosperms, Angiosperm Familiesand Plant Ecology*)

PC-BOT-313
(*Plant Anatomy, Cell Biology & Genetics, Microbiology and Biostatistics*)

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN
Under CBCS-Semester-Grading pattern
B.Sc. (Semester-V)**Programme**
Core Compulsory Course in BOTANY
CC-BOT-311(*Algae, Fungi and Plant Pathology***)**

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

Unit-I :: Algae

- Cyanobacteria: General characters, Organization of Thallus: Unicellular forms, Collonial forms: Non-filamentous and Filamentous colonies. Economic importance of Cyanobacteria.
- General characters of Algae andThallus organization of Algae: Colonial, Coenobium and Filamentous. Ultra structure of Algal (Eukaryotic) cell i.e., *Chlamydomonas* cell. Harmful aspects of Algae.
- Typical life histories of algae belonging to various divisions including classification (Smith,1958), occurrence, structure, reproduction (excluding development):
  - Cyanophyta: ***Nostoc***
  - Chlorophyta: ***Oedogonium***
  - Phaeophyta: ***Ectocarpus***
  - Rhodophyta: ***Batrachospermum***

PRACTICALS:
Classify with reasons (up to family), i dentify and describe structural peculiarities of **Algae** mentioned in Theory syllabus.

Cyanophyta: ***Nostoc***
- **Material:** Vegetative structure.
- **Permanent slide:** Thallus, Heterocyst.

Chlorophyta: ***Oedogonium***
- **Material:** Vegetative structure (Thallus), Antheridium: M acrandrous sp., Oogonium: Macrandrous sp.
- **Permanent slide:** Thallus, Antheridium: Macrandrous sp., Antheridium: Nanandrous species., Oogonium: Macrandrous species., Zygote.

Phaeophyta: ***Ectocarpus***
- **Material:** Veg.structure, asexual reproductive struct ures- Uni & Pluri-locular sporangia
- **Permanent slide:** Thallus, asexual reproduction - Uni and Pluri-locular sporangia.

Rhodophyta: ***Batrachospermum***
- **Materail:** Vegetativeand reproductive structure - carposporangia and cystocarp
- **Permanent slide:** Thallus, cystocarp.

References:

Hait G, Bhattacharya K and Ghosh A K **(2008)** ***A Text Book of Botany*****, Vol-I,** New Central Book Agency (P) Ltd., Kolkata(1st Edition's Reprint).

Singh V, Pande P C and Jain D K **(2008-09)** ***A Text Book of Botany,*** Rastogi Publications, Meerut(4th Revised Edition's Reprint).

Vasishtha B R, Sinha A K and Singh V P (2007), ***Botany for degree students-Algae*** **(5th edition),** S. Chand & Co. Ltd., New Delhi.Pandey B P (2001), ***College Botany Vol. I,*** S. Chand & Co. Ltd., New Delhi.

Purohit S S and Deo P P (2005), ***UGC Unified College Botany –First Year*****,** Student edition, Jodhpur.

Gangulee S.C., Das K.S., Dutta C.D. and Kar (1985), ***College Botany Vol. I, II & III***, New Central Book Agency, Kolkata.

Pandey S N, Misra S P, Mukharjee and Trivedi P S (2003) ***A Text Book of Botany Vol.I& II,*** *Vikas Publ. H. P L, N. Delhi.*

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Unit-II :: Fungi

- General characters, Modes of nutrition, Thallus organization: Unicelluar, Filamentous - aseptate and septate mycelia.
- Typical life histories of fungi belonging to various division s including Classification (G C Ainsworth, 1973), occurrence, structure, reproduction (excluding development):
  - Oomycetes: ***Pythium***
  - Ascomycetes: ***Erysiphae***
  - Basidiomycetes: ***Agaricus***
- Forms of spore in Fungi: Asexual Spores, Sexual Spores.

PRACTICALS:

Classify with reasons (up to family), identify and describe structural peculiarities of **Fungi** mentioned in Theory syllabus.

Oomycetes: ***Pythium***

- **Material**: Vegetative structure, Reproductive body: Asexual and Sexual.
- **Permanent slide**: Mycelium, Reproductive structure: Asexual, Sexual and Zygospore.

Ascomycetes: ***Erysiphae***

- **Material:** Vegetative structure, reproductive body-cleistothecium.
- **Permanent slide:** Mycelium, reproductive structure- cleistothecium.

Basidiomycetes: ***Agaricus***

- **Material:** reproductive fruiting bodies
- **Permanent slide:** reproductive structure, L. S. and T. S. of gills.

References:

Hait G, Bhattacharya K and Ghosh A K (2008) AText Book of Botany, Vol -I, New Central Book Agency (P) Ltd., Kolkata (1st Edition's Reprint).

Singh V, Pande P C and Jain D K (2008-09) A Text Book of Botany, Rastogi Publications, Meerut (4th Revised Edition's Reprint).

Sharma P D (2003) The Fungi, Rastogi Publications, Meerut (2nd Edition's Reprint).

Vashishta B R and Sinha A K (2007) Botany for Degree Student s –Fungi, S Chand & Company Ltd., New Delhi (1st Edition's Revised and Multicolour-Reprint).

Vasishtha B R and Sinha A K (2002), Botany for degree students -Fungi (5th edition), S. Chand & Co. Ltd., New Delhi

Sharma O P (2002), Text Book of Fungi (9th edit ion), Tata McGraw-Hill Publishing Co Ltd.,Delhi

Dubey H.C. (2005), An Introduction to Fungi, (3rd edition), Vikas Publishing House P. Ltd.,New Delhi

Sundra Rajan S (2001), Introduction to Fungi, (1st edition), Anmol Publications P. Ltd., New Delhi.

Swanton E W (2002), Fungi (), Surbhi Publications, Jaipur

Alexopoulos C.J., Mims C W and Blackwell M (2002)Introductory Mycology (3rd edition), John Wiley & Sons, New York.

Sumbali Geeta (2005), The Fungi, Narosa Publishing House, New Delhi.

Pandey B P (2002), Botany B Sc I, S Chand & Co L, New Delhi

Unit-III :: Plant Pathology

- The Fundamentals of Plant Pathology: Plant Pathogens: Bacteria, Virus and Fungi.
- Classification of plant diseases on the basis of nature of the causal agent and occurrence.
- General symptoms, causal organism, disease cycle and control measures of following Plant diseases:
  - White rust of Crucifer,
  - Black rust of Wheat and
  - Wilt of Cotton

PRACTICALS:

Plant diseases: Study through **Fresh/Preserved material and Permanent slide**

- **White rust of Crucifer**- reproductive structure-conidia
- **Black rust of Wheat**- reproductive structures-Telutospores, Uredospores
- **Wilt of Cotton**- reproductive structure-conidia, cleistothecium

References:

Rangaswami G (1988) Diseases of Crop plants in India, Prentice -Hall of India Pvt. Ltd., New Delhi (3rd Edition).

Pandey B P (2006) Plant Pathology-Pathogen and Plant Diseases, S Chand & Co. Ltd., New Delhi (1st Edition's Reprint).

Mehrotra R S (1991) Plant Pathology, Tata McGraw-Hill Publishing Co. Pvt. Ltd., New Delhi (8th Edition's Reprint).

Agrios George N (2004) Plant Pathology, Academic Press, Reed Elsevier India Pvt. Ltd., New Delhi (4th Edition/ 1st Indian Edition's Reprint).

Sharma P D (2003) Microbiology and Plant Pathology, Rastogi Publications, Meerut (2n d Edition's Reprint).

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN
Under CBCS-Semester-Grading pattern
B.Sc. (Semester-V)**Programme**
Core Compulsory Course in BOTANY
CC-BOT-312 (*Bryophyta, Pteridophyta and Gymnosperms***)**

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

Unit-I :: Bryophyta

- General characters of Bryophyta. Origin of Bryophyta: From Algae and From Pteridophytes.
- Vegetative reproduction in Bryophytes.
- Typical life-histories of Bryophyta belonging to various divisions including Classification (Proskauer, 1957), Occurrence, External and Internal Structure of Thallus and Reproduction (excluding development).
    - Hepaticopsida: ***Riccia***
    - Anthocerotopsida: ***Anthoceros***
    - Bryopsida: ***Funaria***

PRACTICALS:

Classify with reasons (up to family), identify and describe struct ural peculiarities of **Bryophytes** mentioned in Theory syllabus.

Hepaticopsida:***Riccia***

- **Material:** Vegetative structure: Thallus, Reproductive body: Antheridia and Archegonia.
- **Permanent slide:** Tallus (W M), V S of Thallus, Reproductive structure: Antheridia (W M) and Archegonia (W M), V S of Sporophyte/Capsule.

Anthocerotopsida:***Anthoceros***

- **Material:** Vegetative structure: Thallus, Reproductive body: Sporophyte/Capsule.
- **Permanent slide:** Tallus (W M), V S of Thallus, Reproductive structure: Antheridia (W M) and Archegonia (W M), T S of Sporophyte/Capsule V S of Sporophyte/Capsule.

Bryopsida: ***Funaria***

- **Material:** Vegetative structure: Thallus, Sex organs, Sporophyte/Capsule, Spores, Peristomal teeth.
- **Permanent slide:** Tallus (W M), Sex organs, L.S. of capsule, Peristom e, Protonema.

References:

Singh V, Pande P C and Jain D K **(2008-09)** ***A Text Book of Botany,*** Rastogi Publications, Meerut(4th Revised Edition's Reprint).
Vashishta B R and Sinha A K (**2007**) ***Botany for Degree Students –Bryophyta***, S Chand & CompanyLtd., New Delhi (1st Edition's Revised and Multicolour-Reprint).
A V S S Sambamurty (2005), ***A text book of Bryophytes, Pteridophytes, Gymnosperms and Paleobotany*** **( ),**
Parihar N.S. ( ), ***Pteridophyta***

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Unit-II :: Pteridophyta

- General characters of Pteridophyta. Apospory and Apogamy.
- Types of Stele in Pteridophytes.
- Typical life-histories of Pteridophyta belonging to various divisions including Classification (Smith, 1955), Occurrence, External and Internal Structure of Plant body and Reproducti on (excluding development).
    - Lycophyta: ***Selaginella***
    - Arthrophyta: ***Equisetum***
    - Pterophyta: Leptosporangiopsida :***Marsilea***

PRACTICALS:

Classify with reasons (up to family), identify and describe structural peculiarities of **Pteridophytes** mentioned in Theory syllabus.

Lycophyta: ***Selaginella***

- **Material:** Plant body (Veg organs -root, stem, rhizophoe, leaf), reproduction - cone/ strobilus.
- **Permanent slide:** Plant body (WM), T.S. of root, T.S. of stem, T.S. of rhizophore, leaf (WM), reproduction: L. S. of cone, Megaspore (WM), Microspore (WM).

Arthrophyta: ***Equisetum***

- **Material:** Plant body (Veg. organs - stem, scaly leaves), reproduction - cone/ strobilus.
- **Permanent slide:** Plant body (WM), T. S. of stem, scaly leaves (WM), reproduction: L. S. of cone, T. S. of cone, Spores (WM).

Pterophyta**:** Leptosporangiopsida - ***Marsilea***

- **Material:** Vegetative structure (External and Internal): Root, Stem, Leaf. Reproductive body: Sporocarp.
- **Permanent slide:** T S of Root, Stem, Leaf, Reproductive structure: T S/V S of Sporocarp, Microspore, Megaspore.

References:

Singh V, Pande P C and Jain D K **(2008-09)** ***A Text Book of Botany,*** Rastogi Publications, Meerut(4th Revised Edition's Reprint).

Vashishta B R and Sinha A K (**2007**) ***Botany for Degree Students –Pteridophyta***, S Chand & CompanyLtd., New Delhi (1st Edition's Revised and Multicolour-Reprint).

Hait G, Bhattacharya K and Ghosh A K **(2008)** ***AText Book of Botany*****, Vol-I,** New Central Book Agency (P) Ltd., Kolkata(1st Edition's Reprint).

Unit-III :: Gymnosperms

- Introduction: Affinities of Gymnosperms with Pteridophytesand Angiosperms.
- Economic importance of Gymnosperms.
- Typical life-histories of Gymnosperms belonging to various divisions including Classification (Taylor, 1981), Occurrence, Structure and Reproduction (excluding developme nt).
    - Coniferales: ***Pinus***
    - Ephedrales: ***Ephedra***

PRACTICALS:

Classify with reasons (up to family), identify and describe structural peculiarities of **Gymnosperms** mentioned in Theory syllabus.

Coniferales: ***Pinus***

- **Material**: Vegetative organs-leaves (needles), reproductive structures- male cone, female cone, Microspores (pollen grains).
- **Permanent slide:** Sections of stem, T.S. of leaf, reproduction: L. S. of male cone, T. S. of ovule, Microspores/Pollen grains (WM).

Ephedrales: ***Ephedra***

- **Material**: Vegetative organs. Reproductive structures- Male cone, Female cone, Microspores (pollen grains).
- **Permanent slide**: Sections of vegetative organs. L. S. of male cone, T. S. of ovule, Microspores/Pollen grains (WM).

References:

Biswas C and Johri B M **(2004)** ***The Gymnosperms*****,** Narosa Publishing House, New Delhi(2nd Reprint Edition).

Vasishta P C **(2005)** ***Botany for Degree Students Gymnosperms,*** S Chand & Company Ltd., New Delhi(1st Edition's Reprint)

Pandey B P **(2003)** ***College Botany –Vol.-II,***S Chand & Company Ltd., New Delhi(1st Edition's Reprint)

Pandey S N, Misra S P and Trivedi P S **(2003)** ***A Text Book of Botany –Vol.-II,***Vikas Publishing House Pvt Ltd., New Delhi(11th Revised Edition's Reprint).

Singh V, Pande P C and Jain D K **(2008-09)** ***A Text Book of Botany,*** Rastogi Publications, Meerut(4th Revised Edition's Reprint).

Pandey B P **(2003) Simplified Course in** ***Botany –B Sc-II,***S Chand & Company Ltd., New Delhi(1st Edition's Reprint)

Bhatnagar S P and Moitra Alok **(2006)** ***Gymnosperms„***New Age International (P) Ltd, Publishers., New Delhi(1st Edition's Reprint)

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN

Under CBCS-Semester-Grading pattern

B.Sc. (Semester-V)**Programme**

Core Compulsory Course in BOTANY

CC-BOT-313(*Angiosperm Families, Plant Ecology and Plant Anatomy***)**

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

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

Unit-I :: Angiosperm Families

- Studies of Angiosperm families:
  Distinguishing characters and classification up to family with reasons as per Bentham and Hooker's (1862-80) system of classification of the following families including floral formula, floral diagram and botanical names of economically important any five plants:
  - Dicotyledons:
    - **Polypetalae:** Tiliaceae, Rhamnaceae,Cucurbitaceae.
    - **Gamopetalae:** Solanacae, Convolvulaceae, Scrophulariceae, Bignoniaceae, Lamiaceae.
    - **Monochlamidae:** Amaranthaceae.
  - Monocotyledons: Commelinaceae, Amaryllidaceae.

PRACTICALS:

Identify and classify (as per Bentham and Hooker's system) the family giving reasons and Draw diagrams: A flowering twig, L S of Flower, other floral structures, floral formula and floral diagram of locally available plant specimens of families as mentioned below.

Dicotyledons:

Polypetalae: Tiliaceae, Rhamnaceae, Cucurbitaceae.

Gamopetalae: Solanacae, Convolvulaceae, Scrophulariceae, Bignoniaceae, Lamiaceae.

Monochlamydae: Amaranthaceae.

Monocotyledons: Commelinaceae, Amaryllidaceae.

References:

Lawrence G H M **(1967)** ***Taxonomy of Vascular Plants*****,** Oxford & IBH Publishing Co.Pvt Ltd., New Delhi (1st Indian Edition).

Singh V Pande P C and Jain D K **(1995)** ***A Text Book of Botany-Angiosperms*****,** Rastogi Publications, Meerut(1st Edition's Reprint).

Singh V and Jain D K **(1999)** ***Taxonomy of Angiosperms*****,** Rastogi Publications, Meerut(2nd Edition's Reprint).

Unit-II :: Plant Ecology

- Climatic Factors: Light factor: Light in relations to Plants. Temperature factor: Effects of temperature on Plants, Variations in temperature and its effects on distribution on Plants. Precipitation (Rainfall), Humidity in air and Wind.
- Biotic Factor: Positive interactions: Mutualism and Commensalism. Negative inter action: Parasitism and Predation. Abiotic environment: Liebig's Law of Minimum, Shelford's Law of Tolerance.

- Autecology: Introduction, Regeneration of a species: Seed output, Seed dispersal, Seed viability, Seed germination and reproductive capacity.
- Edaphic Factor: Soil: Soil Complex: Components and Properties: Mineral matter: Soil Texture, Soil structure and Porosity. Soil air, Soil Water, Soil Solution, Soil Organic matter and Soil Organisms.

PRACTICALS

- Study of ecological instruments:
  - Maximum and Minimum Thermometer
  - Dry and Wet Bulb Thermometer
  - Hygrometer
  - Anemometer
  - Rain guage
- To determine Carbonate, Nitrate and Base deficiency in scale of 0-5 in soil sample.
- To determine Chloride content in a water sample.
- To determine pH in a water and soil sample.
- To determine Total hardness of a water sample.
- To determine Carbonate and Bi-carbonate in a water sample.
- To determine field/water holding capacity of different soil samples.
- Mechanical separation of soil sample to study the percentage of different particle s (contents) of soil samples.
- Study of Physical characters i.e., weight, length, width, volume, colour and shape of the seed.
- Biotic Interactions between living organisms:
  - Mutualism : Root nodules, Lichen (specimen and permanent slides)
  - Parasitism :*Cuscuta* (specimen and permanent slide), *Loranthes* (specimen)

References:

Sharma P D **(2003)** ***Ecology and Environment*****,** Rastogi Publications, Meerut. (7th Edition's Reprint).
Agrawal K C **(2001) Fundamentals of Environmental Bio*logy*,** Nidhi Publishers (India), Bikaner. (1st Edition).
Subrahmanyam N S and Sambamurty A V S S **(2000)** ***Ecology*****,** Narosa Publishing House, New Delhi. (1st Edition).
Kormondy E J **(2002)** ***Concept of Ecology*****,** Prentice-Hall of India Pvt Ltd., New Delhi(12th Indian Edition Reprint).

Unit-III :: Plant Anatomy

- Stomata: Structure and Function, Types-According to Metcalfe and Chalk (1950).
- Secretory Tissue: Glandular trichomes, Hydathodes, Resin ducts and Laticifers.
- Nodal Anatomy: Leaf Traces and Leaf gaps. Types of nodes.
- Ergastic substances: Food Products-Carbohydrates, Nitrogenous Products and Fats. Mineral crystals and Alkaloids.
- Leaf fall and wound healing.

PRACTICALS:

- To study the various types of Stomata as per theory syllabus:
  Anomocytic: From any plant species of families Papaveraceae, Capparaceae, Nyctaginaceae. **Anisocytic**: From any plant species of families Brassicaceae, Solanaceae, Convolvulaceae. **Diacytic**: From any plant species of families Lamiaceae, Acanthaceae and **Paracytic**: From any plant species of family Rubiaceae.
- To study the **Glandular Trichomes** from *Datura*, *Ocimum* stem epidermis, fruit wall of *Boerhaavia diffusa*. **Hydathode** from *Colocasia* leaf, *Nephrolepis* leaflet.**Resin ducts** from *Pinus* leaflet, Sunflower stem.
- To study Articulated or Non-Articulated Latex tissue from the plant species of families viz., Convolvulaceae, Sapotaceae, Caricaeae, Asteraceae, Euphorbiaceae, Asclepiadaceae, Moraceae, Papaveraceae and Apocynaceae.

- To study the Uni_, Tri_ and Multilacunar nodes from stem (Nodal region) of *Annona*, *Azadirachta and Chenopodium* respectively.

- To study the ergastic substances with appropriate staining:
  - Starch grains: various types e.g., Caryopsis of Maize, Wheat, Riceand tuber of Potato.
  - Aleurone layer e.g., Maize. Aleurone crystals e.g., Seed of castor.
  - Fat particles e.g., seed of Castor, Groundnut and Coconut (endosperm).
  - Mineral Crystals e.g., **Calcium oxalate**: Raphids-Petiole of *Colocacia*and Stem of *Commelina*. Sphaeraphids: *Nerium* leaf. **Calcium carbonate**: Cystoliths-*Ficus* (Banyan) leaf
  - Alkaloids e.g., *Withania*-Root, *Vinca*-Stem and *Nicotiana*-leaf and leaf of *Adhatoda* and *Datura*.

References:

Singh V, Pande P C and Jain D K **(1998)** ***Anatomy of Seed Plants*****,** Rastogi Publications, Meerut(1st Edition's Reprint).
Pandey B P **(1997)** ***Plant Anatomy*****,** S Chand & Co. Ltd, New Delhi. (1st Edition's Reprint).
E John Jothi Prakash **(2000)** ***A Text Book of Plant Anatomy*****,** Emkay Publications, Delhi. (2nd Revised Edition).
Tayal M S **(2001)** ***Plant Anatomy*****,** Rastogi Publications, Meerut(5th Edition's Reprint).

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN

Under CBCS-Semester-Grading pattern

B.Sc. (Semester-V)**Programme**

Core Compulsory Course in BOTANY

CC-BOT-314(*Cell Biology & Genetics, Microbiology and Biostatistics***)**

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

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

Unit-I :: Cell Biology & Genetics

- **Cell biology:**
  - Mitochondria: Morphology and Ultra structure, Chemical composition and Functions. Plastids: Types of Plastids, Chloroplasts: Morphology, Chemical composition, Ultra structure and Functions.
- **Genetics:**
  - Non-Mendalian Inheritance: Genetic Interaction: 9:6:1 and 13:3. Crossing over and Linkage maps: Recombination frequencies from a test cross and F_2 data. Linkage groups: Introduction, Chi-square test for segregation ratios and detection of linkage.
  - Chromosomal Aberrations: Structural Changes in Chromosomes-Deletion, Duplication, Inversion, Translocation.Numerical Changes in Chromosomes -Euploidy: Monoploidy, Polyploidy: Autopolyploids, Allopolyploids. Aneuploidy: Monosomy, Nullisomy, Trisomy and Tetrasomy.

PRACTICALS:

Study of cell organelles (as per theory syllabus) through Permanent Slides/Charts/Models/Photographs .

Study of chromosomal aberrations (as per theory syllabus) through Charts/ Models/ Photographs.

Solve Genetical problems and conclude from topics given in the theory syllabus.

References:

Strickberger M W **(2005)** ***Genetics*****,** Prentice-Hall of India Pvt Ltd., New Delhi(3rd Edition-EEE).

Rastogi Veer Bala **(1991-92)** ***A Text Book of Genetics*****,** Kedar Nath Ram Nath, Meerut(9th Revised Edition).

Singh B D (2001) Plant Breeding-Principles and Methods, Kalyani Publishers, Ludhiana (1st Edition's Reprint).

Gupta P K **(2005)** ***Genetics*****,** Prentice-Hall of India Pvt Ltd., New Delhi(3rd Edition-EEE).

Verma P S and Agarwal **(2006)** ***Cell Biology, Genetics*****,** ***Molecular Biology, Evolution and Ecology*****.**S Chand & Company Ltd., New Delhi(1st Multicolour Edition-Reprint).

Sambamurty ( ), ***Genetics*** **(2nd edition)**

Gupta P K (2007), ***Genetics-classical to modern*** **(1st edition)**

Patel B C (2012) Human Genetics (Manav Janinvignan-**in Gujarati**) Gujarat Vishvakosh Trust, Ahmedabad-380 013 (1st edition).

Unit-II :: Microbiology (Bacteriology)

- Cell structure of Bacteria: Cellwall-structure and chemical composition, Cytoplasmic membrane, Mesosomes, Cytoplasmic inclusions and vacuoles, Nuclear material.
- Preparation for light microscope examination: Wet mount and Hanging drop technique. Fixed stained smear- Gram staining.

- Isolation, Maintenance and Preservation of Pure cultures: Streak -plate, Pour plate and Spread plate techniques. Maintenance and Preservation: Periodic tran sfer, overlaying cultures with mineral oil, Freeze-drying, storage at low temperatures.
- The Immune response: Antigens, Antibodies, Monoclonal antibodies.

PRACTICALS

- Study of bacterial cell through diagram, chart/microphotograph.
- Wet mountand Hanging drop technique.
- Fixed stained smear-Gram staining.
- Study of Microorganisms's Isolation techniques through prepared plates.
- Principles and working of following apparatus: Autoclave, Hot air oven and laminar air flow.
- Detection of Blood group-A, B, AB, O/Rh+, Rh- using Blood grouping test.

References:

Pelczar M J, Chan E C S and Krieg N R **(2004)** ***Microbiology*****,** Tata McGraw-Hall Publishing Company Ltd., New Delhi(27th Reprint Edition).

Dubey H C (2004), ***Bacteria, Viruses and Fungi***, Vikas Publishing House P Ltd , New delhi

Prescott, Harley and Klein, ***Microbiology*** **(6th edition),**

Sharma P D (2007), ***Microbiology*** **(6th edition),**

Patel R J and Patel K R (2000), ***Experimental Microbiology*** **Vol.-I,** Aditya, Amdavad.

Powar and Daginawala (1997), ***General Microbiology*** **Vol.I & II,** Himalaya Publishing House, Mumbai.

Unit-III :: Biostatistics

- Measure of Dispersion-I: Definition, computation, Merits and Demerits and Properties of: Mean Deviation and Standard Deviation: Ungrouped data, Grouped data: Discrete series and Continuous series.
- Measure of Dispersion-II: Definition, computation, Merits and Demerits and Properties of: Variance and Co-efficient of Variance. Standard Error.
- Probability: Important terms, Definition of Probability, Theorems of Probability: The Addition Theorem and The Multiplication Theorem.

PRACTICALS

Solve and conclude the statistical problems on:

- Mean deviation,
- Standard deviation,
- Variance,
- Co-efficient of Variance
- Standard error and
- Probability.

References:

Banerjee P K **(2004)** ***Introduction to Biostatistics [A Textbook of Biometry],*** S Chand & Company Ltd., New Delhi(1st Edition).

Prasad S **(2001)** ***Elements of Biostatistics,*** Rastogi Publications, Meerut(1st Edition).

Chandel S R S **(2006)** ***A Hand Book of Agricultural Statistics,*** Achal Prakashan Mandir, Kanpur(1st Edition).

Seat No._____

Hemchandracharya North Gujarat University, Patan

Under CBCS-Semester-Grading pattern

B.Sc. (Semester-V) Programme Practical Examination, November/December -20

Botany Practical - PC-BOT-311

[*Algae, Fungi, Plant Pathology and Bryophyta*]

[In force from **June 2013**]

Date: / /20 **Place:**

Time: **5 Hours**] [Maximum Marks: **65**

Instruction: Students are requested to follow instructions given by the examiners.

1. Identify and classify giving suitable reasons (up to family) the specimens **A**, **B and C**. **18**

2. Identify and describe the structural peculiarities observed in specimens **D, E** and **F**. **15**

3. Make temporary slide of the reproductive organ from the specimen **G.** Draw labeled diagram and show your preparation to the examiner. **5**

4. Expose the Pathogen from the given plant material **H** and prepare temporary slide. Make a labeled diagram and show your preparation to the examiner. **5**

5. Identify and describe peculiarities seen in spot **I, J, K** and **L**. **12**

6. **(a)** Submission and *viva-voce*. **7**

(b) Journal **3**

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Under CBCS-Semester-Grading pattern

B.Sc. (Semester-V) Programme Practical Examination, November/December -20

Botany Practical - PC-BOT-312

[*Pteridophyta, Gymnosperms, Angiosperm Families and Plant Ecology*]

[In force from **June 2013**]

Date: / /20 **Place:**

Time: **5 Hours**] [Maximum Marks: **65**

Instruction: Students are requested to follow instructions given by the examiners.

1. Identify and classify giving suitable reasons (up to family) t he specimens **A**. **8**

2. Identify and describe the structural peculiarities observed in specimens **B**. **8**

3. Make temporary slide of the reproductive organ from the specimen **C**. Draw labeled diagram and show your preparation to the examiner. **5**

4. Refer to the given specimens **D**, **E** & **F** to their respective families giving reasons including floral formula and floral diagram. **18**

5. Identify and describe peculiarities seen in spot **G**, **H** and **I**. **12**

6. Determine …….from given water/soil sample **J**. Show your results to the examiner. **4**

OR

6. Determine Carbonate, Nitrate and Base deficiency in scale of 0 -5 from soil sample **J**. Show your results to the examiner.

7. (**a**) Submission and viva-voce. **7**

(**b**) Journal **3**

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Under CBCS-Semester-Grading pattern

B.Sc. (Semester-V) Programme Practical Examination, November/December -20

Botany Practical - PC-BOT-313

[*Plant Anatomy, Cell Biology & Genetics, Microbiology and Biostatistics*]

[In force from **June 2013**]

Date: / /20 **Place:**

Time: **5 Hours**] [Maximum Marks: **70**

Instruction: Students are requested to follow instructions given by the examiners.

1. Solve and conclude the Genetical problems as per given slip. **12**

A…….

B…….

2. Solve and conclude the Statistical problems as per given slip. **12**

C…….

D…….

3. Show ……from plant material **E**, stains if necessary with appropriate staining. Draw labeled diagram and show your preparation to the examiner. **8**

4. Expose and mount ……. from the given material **F**. Stain if necessary. Show your preparation to your examiner. **8**

5. Proceed to perform Gram positive / Gram nega tive staining from sample **G**. Write principle of staining technique. Show your preparation to the examiner. **8**

OR

5. Perform Bacterial /Protozoan motility of the given sample **G** by hanging drop method. **8**

6. Identify and describe the structural peculiaritie s observed in spot **H, I** and **J**. **12**

7. (a) Submisson and viva-voce. **7**

(b) Journal **3**

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HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN
Under CBCS-Semester-Grading pattern
B.Sc. (Semester-V &VI) **Programme**
Elective Subjective Course in BOTANY
ES-BOT-302 (*Fresh Water Ecology***)**

Theory teaching hours**: 2 Hours/week** Credit: **2.0**

Unit-I

- Definitions: Freshwater, Limnology, Lakes, Ponds, Benthos, Bogs, Marshes and Swamps.
- Properties of freshwater: Physio-chemical characteristic, Factors affecting to fresh water ecosystem: abiotic and biotic (Light, Temperature, Vegetation, etc.).
- Types of Freshwater Ecosystem/Clasification of Freshwater Habitat - Lentic ecosystems (still water) and lotic ecosystems (flowing water).
- Structure of lake (Freshwater Zonation). Aquatic biodiversity (Freshwater only): Aquatic flora (Algae, fresher plants).

Unit-II

- Aquatic food web and food pyramids, primary productivity. Aquatic ecosystem: goods and services.
- Energy flow in freshwater ecosystem.
- Threats to aquatic ecosystem and remediation: Eutrophication, Acidification, Pollution.
- Global issues and legislation for conservation and management of aquatic systems.

References:

Brown L. (1971). Ecology of Fresh Water. Heinemann Educational Books Ltd, London.
Gopal, B, and Bhardwaj, N. (1979). Elements of ecology. Vikash Publishing House Pvt Ltd., New Delhi.
Shrma P. D. (7th Eedition - Reprint 2003). Ecology and Environment. Rastogi Publications, Meerut.
Eugene P. Odum (1971). Fundamentals of Ecology. Toppan Company, Japan.

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Under CBCS-Semester-Grading pattern
B.Sc. (Semester-V &VI) **Programme**
Elective Subjective Course in BOTANY
ES-BOT-303 (*Air Pollution*)

Theory teaching hours**: 2 Hours/week** Credit: **2.0**

Unit-I

- Define: Pollution (416) and pollutants (417). Various principal environmental pollutants with examples (416, 417). Kinds of pollutants: Non-degradable (418) and Bio-degradable (418).
- Air Pollution: Introduction (418), Air quality (419), sources and pollutants: Industrial Chimany wastes (419), Thermal power station (419) and Automobile (420 -421).
- Carbon Compounds: Carbon dioxide (423), Carbon monoxide (425).
- Sulphur compound: Sulphur dioxide (426), Hydrogen sulphide (428).

Unit-II

- Nitrogen oxides: Nitrogen oxide, Nitric oxide and Nitrogen dioxide (428 -429).
- Fluorocarbons (434) and Hydrocarbons (435). Metals (435) a nd Photo-chemicals products (436).
- Prevention and control of air pollution (444 -452).
- Green House Effect (423), Global Warming (425), Ozone -depletion (432), and Acid rain (429).

References:

Shrma P. D. (7th Eedition - Reprint 2003). Ecology and Environ ment. Rastogi Publications, Meerut.

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MICRO BIOLOGY

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B.SC. MICROBIOLOGY SEM-V JUNE-2013

MI-501 MOLECULAR BASIS OF MICROBIAL GENETICS **Credit: 03**
Hours: 45

Unit-1: Fundamentals of genetics

1. DNA structure, Genes, Chro mosomes, cell division, prokaryotic genome, Introduction to classical, Molecular & Evolutionary genetics

Unit-2: Replication of DNA

1. DNA replication
   Single replication, bidirectional movement of replication fork -ori c, priming reaction
2. DNA polymerases, DNA synthesis of leading, lagging strand, Okazaki fragments
3. Termination
4. Models for prokaryotic DNA replication.

Unit-3: Gene Expression & Regulation

1. Transcription of Bacterial DNA
2. Structure of typical bacterial promoter
3. Structure of role of RNA polymerase
4. Initiation, elongation & termination – Rho dependants & independents
5. Salient features between prokary otic & eukaryotic transcription
6. Concept of operon positive & negative control of operon – Lac operon –different mutants of lac operon - Arabinose operon – catabolite repression – Tryptophan operon – Attenuation control
7. Genetics code, important, features of the nature of genetics code
8. Prokaryotic translation – structure of mRNA, t-RNA, Ribosomes, & their role in Translation - Initiation, Elongation, Translocation & termination of protein synthesis.

Unit-4: DNA damages & Repair

1. Direct , indirect & post Replication repair of DNA
2. Photo reactivation, excision Repair , Recombination Repair, Mis match Repair.

References:

1. Instant notes in Genetics, second edition 2 HICKEY & FLETCHER, Viva publications.
2. Principles of Genetics: Eight Edition 1991. John Wiley & SONS by Gardner, Simmons , Snustad.
3. Genetics :Analysis and Principles.1999.Benjamin Cummings.

MI-502 TECHNIQUES IN GENE TRANSFER **Credits: 03**

Hours: 45

Unti-1: Principles of Gene transfer

1. Bacterial recombination : General principles
2. Bacterial plasmids- fertility factor
3. Transfer of plasmid DNA – In vitro plasmid transfer – plasmid replication
4. Properties of particular bacterial plasmids, f -plasmids, R- plasmids, colicinogenic plasmid- Agrobacterium plasmid Ti –broad host range plasmid
5. Transposable genetic elements
6. Insertion sequences- detection of transposition in bacteria – types of bacterial transposons, Mechanism of Replication and non Replicative transposition

Unit-2: Transformation

1. Discovery of transformation
2. Biology of transformation
3. Molecular mechanisms of transformation
4. Mapping by transformation
5. Other uses by transformation

Unit-3: Transduction

1. Generalized transduction
2. Co transduction & linkage
3. Mapping by co-transduction
4. Specialized transduction
5. Formation of specialized transducing particles from lam bda lysogen
6. Specialized transduction of a non lysogen
7. Specialized transduction of a lysogen
8. High frequency transuding lysates
9. Specialized transuding phage as a cloning vehicle

Unit-4: Conjugation

1. Insertion of F- into the *E. coli* chromosome HFr trsnsfer
2. Interrupted matting & time of entry mapp ing
3. HFr mapping and HFr collection
4. Mapping " unselected" Recessive markers
5. Chromosomes transfer by F+ cultures
6. Isolation of HFr Strains & F' plasmids
7. Chromosomes transfer mediated by F' plasmids
8. Rec A- protein & its function

References:

1. Principles of Genetics : Eighth Edition. 1991, John Wiley & Sons by GARDNER, Simmons snustand.
2. Microbial Genetics, Second Edition 1994. Stan ely R. Maloy, John E. Cronar, D. Arcid freifelder, Johnes & Bar lett publishers.
3. Microbiology: second Edition 1993, Lansing M. Harl ey , Donald A. Klein.Win C. Brown publishers.

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MI-503 CLASSICAL GENETICS **Credit: 03**

Hours: 45

Unit-1: INFORMATION TO GENETICS

1. Overview of genetics
2. The relationship between Genes and Traits
3. Fields of Genetics

Unit-2: MENDELIAN PRINCIPLES

1. Principles of inheritance, Relevance of Mendelian laws ,Mendels's Genetics
   a. Segregation of two or more genes
   b. The principles of independent Assortment
   c. Dihybrid test crosses
   d. Mendelian inheritance & Probability
   e. Mutually exclusive events- independent events

Unit-3: GENES & CHROMOSOMES

1. Nature of genetic material, gene structure & function
2. The stability of chromosome complement
3. Mitosis-Meiosis, chromosomes & heredity
4. Determination of X-linked inheritance, sex determination in drosophila

Unit-4: GENETIC LINKAGE AND CHROMOSOME MAPPING

1. Linkage and recombination of genes in a chromosome
2. Genetic mapping – crossing over, crossing over takes place at the four strand stage of meiosis
3. The molecular basis of crossing over , multiple crossing over
4. Genetic mapping for three point –test crosses , double crossing over , genetic mapping and functions- genetic distance and physical distance
5. Mapping by tetrad analysis(introduction)
6. Mitotic recombination – recombination within genes closer look at complementation

References:

1. Genetics : principles and analysis . 4th edition 1998, Denial L. Hartl, Elizabeth tones.
2. Principles of genetics : E.J. Gardner.
3. Genes 9: Benjamin Levin

MI-504 r-DNA TECHNOLOGY **Credits: 03**

Hours: 45

Unit-1: INTRODUCTION AND SCOPE

1. What is genetics engineering
2. Historical perspectives
3. Milestone in biotechnology and recombinant DNA technology

Unit-2: TOOLS OF GENETIC TECHNOLOGY

1. Enzymes – exonuclease, endonuclease
2. Restriction endonuclease- nomenclature examples of some enzymes, S1 nuclease
3. DNA ligase , alkali phosphates , reverse transcriptase ,DNA polymerase, foreign DNA ,cloning vector ,plasmids , bacteriophage , insertion vector recombinan t vector, cosmid, plasmids, c-DNA clone bank
4. Gene bank

Unit-3: TECHNIQUES OF GENETIC ENGINEERING

1. Requirements of molecular biology laboratory
2. Gene cloning in prokaryotes – isolation of DNA to be cloned – insertion of DNA fragments in to vector – use of restriction linkers- use of homo polymer tailes , transfer of recombinant DNA in to bacterial cells.
3. Colony hybridization technique – Immunological test
4. Cloning in eukaryotes in plant cell, yeast, filamentous fungi, Agrobacterium plasmid- plant cell transformation by ultra sonication -liposome mediated- gene transfer
5. Animal cell and animal viruses
6. Electroporation- particle bombardment
7. Microinjection- divert transformation- site directed mutagenesis

Unit-4: APPLICATIONS OF R-DNA TECHNOLOGY

1. Agriculture and environmental applications
   a. In medical applications
   b. In industrial applications

References:

1. Textbook of Biotechnology by R. C. Dubey, Publisher : S. Chand, and Co.
2. Fundamentals of Molecular Biology 2009, Tar ganti K. Pal, Saroj S.
3. Molecular Cell Biology 5th edition by Lodish, Berk, Matsudalia

MI- 505 PRACTICAL

1. **Enzyme induction**
2. **Ultraviolet irradiation survival curve in *E. coli.***
3. **Isolation of Streptomycin resistant mutant of *E. coli* by gradient plate technique.**
4. **Isolation of spontaneous mutant of *E. coli* replica plate technique.**
5. **Isolation of pigment mutant of *Serratia marcescens***
6. **Demonstration: Conjugation in *E. coli***
7. **Isolation of petite mutants of yeast.**
8. **Isolation of Lac^- mutants of *E. coli*.**
9. **Isolation of bacteriophage from sewage.**
10. **Isolation of temperature sensitive mutant.**
11. **Demonstration: AMES test.**

Subjective Elective **Credits: 2**

Hours: 30

BIOINFORMATICS

Unit-1: INTRODUCTION TO BIOINFORMATICS

1. Definition & Scope
2. Basic computing & Development of database

Unit-2: COMPONENTS OF BIOINFORMATICS

1. Sequence Analysis (similarity, identity & homology), BLAST and F ASTA
2. Applications of Bioinformatics

Scheme for Semester End Examination

Semester – V Paper : 501 to 504

EX-1 Microbial growth Marks 40

Ex-2 Isolation of mutant for _____ from the given sample. Marks 40

Ex-3 Enzymology Marks 40

Ex-4 Spotting Marks 20

Ex-5 Viva Marks 40

Ex-6 Journal and Slides Marks 20

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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 2013 (In continuation)

Faculty:Science

Subject:Zoology

SYLLABUS

SEMESTER – V & VI

Total Number of Pages: 1 to 32

Submitted on
Date: / /2013

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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 chan ging 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 conside red 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 Uni versity/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 stude nt 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, accredit weightage in Semester V and VI of B.Sc Programme for each core co urse 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 and the foundation courses shall be abbreviated respectively as CC, PC, EG, ES and FC.

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

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

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

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

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

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

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

Attendance:

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

Medium Instruction:

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

Language of Question Paper:

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

Evaluation Methods:

1. A student shall be evaluated through Comprehensive Continuous Assessment (CCA)/ (Internal Evaluation) as well as the End of Semester examination (External Evaluation). The weight-age of CCA shall be 30%, 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-20 marks
- Assignments/Seminar/MCQ exam, etc. - 05 marks
- Attendance -05 marks

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

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

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

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

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

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

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

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

Time: 2 hours] [Total Marks: 50

1. a. Answer the following (Any one out of two) 10

   b. Attempt any two of following (out of three) 10

2. a. Answer the following (Any one out of two) 10

   b. Attempt any two of following (out of three) 10

3. Answer the following (Any FIVE out of SEVEN) 10

   (Definition, MCQ, Objective type questions, etc.)

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

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

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

1. a. Answer the following (one out of two) 10

   b. Attempt any one (out of two) 08

2 a. Answer the following (one out of two) 10

   b. Attempt any one (out of two) 08

3. a. Answer the following (one out of two) 10

   b. Attempt any one (out of two) 08

4. a. Answer the following (any six out of ten) 12

   (At least two question from each unit)

   b. Attempt the any four (out of seven) 04

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B.SC. SEMESTER-V

ZOOLOGY

Course – VII

CC Z-501

(COMPARATIVE ANATOMY OF VERTEBRATA)

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

UNIT-I TAXONOMY AND ANATOMY OF RAT

- CHARACTERS OF VERTEBRATES; CLASSIFICATION OF AMNIOTES UP TO ORDERS

ANATOMY OF RAT:

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

UNIT-II COMPARATIVE ANATOMY:
DIGESTIVE SYSTEM AND EXCRETORY SYSTEM

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

UNIT-III COMPARATIVE ANATOMY:

RESPIRATORY SYSTEM AND CIRCULATORY SYSTEM

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

REFERENCES

- Comparative anatomy of chordate, W C Weichert
- Comparative vertebrata, Kardong
- A Text book of Chordata, E L Jorden & P S Verma
- A Text book of Chordata, P S Dhami & P S Dhami
- A Life of vertebrata, J Z Young
- A Text book of Chordata, N. Arumugam
- પૃષ્ઠવશા પ્રાણાઆના તુલનાત્મક શારારકા, . .ણ બાડ,
- .ાવધા, . .ણ બાડ,

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B.SC. SEMESTER-V
ZOOLOGY
LABORATORY COURSE – VII
PC Z 501
(COMPARATIVE ANATOMY OF VERTEBRATA)

Credit: 1.5

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

REPTILES: TURTLE; UROMASTIX; GECKO; DRACO; SNAKE
AVES: PIGEON; CROW; SHIKRA; POND HERON; OWL, PELICAN
MAMMALS: BAT; DOLPHIN; RABBIT; LORIS; MANGOOSE

- TO STUDY DIFFERENT SYSTEM OF RAT(AS PER THEORY) THROUGH DEMONSTRATION/MODEL/CHART
- TO STUDY STRUCTURE AND TYPES OF TEETH IN VERTEBRATES THROUGH SPECIMEN
- TO STUDY DENTITION IN VARIOUS MAMMALS THROUGH SPECIMEN
- TO STUDY STRUCTURE OF RUMINANT STOMACH IN MAMMAL THROUGH CHART OR SPECIMEN
- TO STUDY STRUCTURE OF INTESTIN E OF HERBIVORES AND CARNIVORES
- TO STUDY COMPARISON OF MESONEPHRIC AND METANEPHRIC RENAL ORGAN
- TO STUDY STRUCTURE OF GILLS AND SWIM BLADDER THROUGH SLIDE AND SPECIMEN
- TO STUDY COMPARISON OF STRUCTURE OF HEART IN POIKILOTHERMS AND HOMEOTHERMS THROUGH MODEL A ND SPECIMENS
- TO STUDY COMPARISON OF AORTIC ARCHES IN VERTEBRATES THROUGH MODELS
- TO STUDY IDENTIFICATION OF GROUP OF ANIMALS THROUGH TYPES OF VERTEBRA ON THE BASIS OF CENTRUM IN VERTEBRATES
- TO STUDY COMPARISON OF PECTORAL GIRDLES IN VERTEBRATES
- TO STUDY COMPARISON OF PELVIC GIRDLES IN VERTEBRATES
- TO STUDY GENERAL STRUCTURE OF BRAIN OF VERTEBRATE THROUGH SPECIMEN OR MODEL
- TO STUDY COMPARISON OF ANATOMY OF BRAIN IN DIFFERENT GROUP OF VERTEBRATES

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN
Practical Examination
B.Sc. Sem. V Zoology
PC Z 501
(COMPARATIVE ANATOMY OF VERTEBRATA)

Time: 5 HOURS [Total Marks: 50
Date:

1. **Identify the given organ/system and compare its anatomical features in relation to their adaptation, draw its labeled diagram and show it to examiner.** **12**
   (Heart, Aortic arches, kidney, Brain, Pectoral and Pelvic girdles)

2. **Draw a labeled diagram of _____ system of Rat and show it to examiner** **08**

3. **Draw a labeled diagram of _____ structure of Rat and show it to the examiner** **05**

4. **Do as directed:** **15**
   1. **Identify and classify it up to order with proper reseans.**
   2. **Identify and classify it up to order with proper reseans.**
   3. **Identify and explain its structural importance.**
      (gills, swim bladder, ruminant stomach, tooth,)
   4. **Identify the group of animal through given specimen and draw a labeled diagram.** **(vertebra, girdles, Dentition)**
   5. **Identify the pointed part and state its function/s.**
      (Any part of organ system which may not be asked in previous exercise)

5. **Viva-voce** **05**

6. **Journal** **05**

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B.SC. SEMESTER-V
ZOOLOGY
Course-VIII
CC Z 502
(DEVELOPMENTAL BIOLOGY)

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

UNIT-I FUNDAMENTALS OF EMBRYOLOGY

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

UNIT-II FERTILIZATION AND CLEAVAGE

- FERTILIZATION: DEFINITION; APPORXIMATION OF GAMETES; SPERM PENETRAT ION; ACROSOMAL REACTION; CORTICAL REACTION; PHYSIOLOGICAL CHANGES DURING FERTILIZATION
- CLEAVAGE: PLANES OF CLEAVAGE; PATTERNS OF CLEAVAGE; TYPES OF BLASTULA

UNIT-III DEVEL0PMENT OF FROG AND CHICK

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

REFERENCES

- Embryology, M.P.Arora, Himalaya Publishing house, Bombay
- A Text book of Embryology, N. Arumugam, Saras Publications
- Chordate Embryology, V. K. Agrawal & P.S. Verma, S. Chand & company LTD.,2004 (Developmental biology)
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ZOOLOGY
LABORATORY COURSE – VIII
PC Z 502 (DEVELOPMENTAL BIOLOGY)

Credit: 1.5

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

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSIT Y, PATAN
Practical Examination
B.Sc. Sem. V Zoology
PC Z 502
(DEVELOPMENTAL BIOLOGY)

Time: 5 HOURS [Total Marks: 50
Date:

1. Prepare a temporary mounting of chick embryo, stain it if necessary, determine the hours of development and show it to examiner. 10

2. Prepare a temporary mounting of sperm from given material, stain if necessary, sketch a labeled diagram and show it to examiner. 7

3. Do as directed: 15
   a. Identify and describe the process (p.s. of gamatogenesis)
   b. Identify and describe. (Eggs/cleavage)
   c. Identify and describe. (Blastula/ Gastrula)
   d. Identify and comment. (Metamorphosis/ T.S. through organs)
   e. Identify and give its significance. (Torsion/flexures)

4. Viva-voce 5

5. Journal 5

6. Submission 8

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

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

UNIT-I BASICS OF INHERITANCE

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

UNIT-II PHYSICAL AND CHEMICAL BASIS OF INHERITANCE

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

UNIT-III HUMAN GENETICS

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

REFERENCES

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

Credit: 1.5

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

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN
Practical Examination
B.Sc. Sem. V
Zoology
PC Z 503 (GENETICS)

Time: 5HOURS] [Total Marks: 50

Date:

1. Make a temporary preparation of _____ from given material. 10
Show it to Examiner. (Giant chromosome)

2. Make temporary preparation of _____ from given material. 5
Show it to Examiner. (Mitosis)

3. Solve the given genetical problem: 10
A. on the basis of Post-Mendelian genetics
B. On the basis of Sex-linked Inheritance/
Draw PE-Degree chart by using given information

4. Prepare a Karyotype from given Information/photograph and Identify. 6
State important features of an individ ual

5. Do as directed: Specimens 9
a. Identify and describe(Twins; cytoplasmic inheritance, aneuploidy)
b. Identify and describe
c. Identify and state its law of inheritance.

6. Journal 5

Viva-voce 5

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B.SC. SEMESTER-V
ZOOLOGY
Course-X

CC Z 504
(ENVIRONMENTAL BIOLOGY AND TOXICOLOGY)

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

UNIT-I ENVRIONMENTAL BIOLOGY

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

UNIT-II ENVIRONMENTAL POLLUTION

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

UNIT-III TOXICOLOGY

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

REFERENCES

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

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

CC Z 504
(ENVIRONMENTAL BIOLOGY AND TOXICOLOGY)

Credit: 1.5

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

TIME: 5HOURS [TOTAL MARKS: 50
DATE:

1. **Estimate the amount of _____from given water 10**

Samples. State your conclusion as environmental point of view .

2. **Estimate the amount of _____ from given soil Sample. State your conclusion regarding texture and usefulness.** **10**

3. **Determine LC 50 of _____ toxicant and state your Conclusion/Suggestions if any.** **08**

4. **Prepare a graphic representation with help of the given climatic Data.** **04**

5. **Write as per instruction for the given ecological apparatus, Instruments.** **04**
   a. **Principle**
   b. **Labeled diagram**
   c. **Mode of action**
   d. **Use**

6. **Identify and comment on given chart A & B related to environment and pollution .** **04**

7. **Journal** **05**

   Viva-voce **05**

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

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

UNIT-I CARBOHYDRATES

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

CHEMISTRY

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Programme code :		**Programme Name :**	B.Sc.
Faculty :	SCIENCE	**Semesters :**	V
Subject :	CHEMISTRY		
Effective from :	જૂન–૨૦૧૩ થી		

Sr.	Paper Code	Name of Paper	Credit
1	CC CH- 501	CORE COMPULSORY-INORGANIC CHEMISTRY - I	3
2	CC CH-502	CORE COMPULSORY-ORGANIC CHEMISTRY - II	3
3	CC CH- 503	CORE COMPULSORY-PHYSICAL CHEMISTRY - III	3
4	CC CH- 504	CORE COMPULSORY-STRUCTURAL-ANALYTICAL CHEMISTRY - IV	3
5	SE CH- 505 A	Synthetic Dyes	2
	SE CH- 505 B	Oils, Fats and Waxes	
	SE CH- 505 C	Paints and Varnishes	
	SE CH- 505 D	Cosmetic Chemistry	
	SE CH- 505 E	Metallurgy	
6	GE CH- 506 A	ELECTIVE (GENERIC) COURSE	2
	GE CH- 506 B	ELECTIVE (GENERIC) COURSE	
	GE CH- 506 C	ELECTIVE (GENERIC) COURSE	
7	LC CH-507 A	Laboratory course-I Inorganic Chemistry Practicals	1.5
	LC CH-507 B	Laboratory course-II Organic Chemistry Practicals	1.5
	LC CH-507 C	Laboratory course -III Physical Chemistry Practicals	1.5
	LC CH-507 D	Laboratory course -IV Viva-Voce	1.5

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Programme code :		**Programme Name :**	B.Sc.
Faculty :	SCIENCE	**Semesters :**	VI
Subject :	CHEMISTRY		
Effective from :	જૂન–૨૦૧૩ થી		

Sr.	Paper Code	Name of Paper	Credit
1	CC CH- 601	CORE COMPULSORY-INORGANIC CHEMISTRY - I	3
2	CC CH-602	CORE COMPULSORY-ORGANIC CHEMISTRY - II	3
3	CC CH- 603	CORE COMPULSORY-PHYSICAL CHEMISTRY - III	3
4	CC CH- 604	CORE COMPULSORY-STRUCTURAL-ANALYTICAL CHEMISTRY - IV	3
5	SE CH- 605 A	Polymer Chemistry	2
	SE CH- 605 B	Chemistry of Portland Cement	
	SE CH- 605 C	Food Additives	
	SE CH- 605 D	Soaps and Detergents	
	SE CH- 605 E	Forensic Chemistry & Toxicology	
6	GE CH- 606 A	ELECTIVE (GENERIC) COURSE	2
	GE CH- 606 B	ELECTIVE (GENERIC) COURSE	
	GE CH- 606 C	ELECTIVE (GENERIC) COURSE	
7	LC CH-607 A	Laboratory course-I Inorganic Chemistry Practicals	1.5
	LC CH-607 B	Laboratory course-II Organic Chemistry Practicals	1.5
	LC CH-607 C	Laboratory course -III Physical Chemistry Practicals	1.5
	LC CH-607 D	Laboratory course -IV Viva-Voce	1.5

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HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY

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NAAC Accreditation Grade – "B"

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FACULTY OF SCIENCE

CHEMISTRY SYLLABUS

(Effective from June-2013)

B.Sc. (semester V & VI Programme)

The proposed new courses in chemistry for under graduate 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 and the question paper should be drawn in Gujarati with the English version. Students are permitted to write answer in English or Gujarati language.

Its objective 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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HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY

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NAAC Accreditation Grade – "B"

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FACULTY OF SCIENCE

CHEMISTRY SYLLABUS

(Effective from June-2013)

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 question / M.C.Q / Short numerical / diagram (Four Questions to be asked from each Unit.)	**10 Marks**

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HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY

PATAN-384265

NAAC Accreditation Grade – "B"

FACULTY OF SCIENCE

Chemistry syllabus

Effective from June-2013

This syllabus is to be completed by assigning three periods of one hour each and four practicals of three hours each per week. The number of students in a practical batch should not exceed fifteen.

Pattern of examination:

There will be four paper for core compulsory and one paper for subject elective theory and fourteen hours (two days) for practical in the university examination

The pattern of university exam :

Written	Examination time	Marks External	Marks Internal
Core Course	3 hours (per course)	70	30
Practical Core Course	7 hours (two days)	200	--
Subject elective course	2 hours	50	--

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Hemchandracharya North Gujarat University, Patan

B. Sc. Chemistry

Semester : V

જૂન–૨૦૧૩ થી

Inorganic Chemistry

Paper : CC CH – 501

UNIT – I : Reaction Mechanism of Coordination Compounds

- Substitution reaction of square plannar complexes
- Reaction of Platinum II complexes, the trans effect, theories of trans effect, use of synthesis in trans effect and analysis
- Substitution reaction in octahedral complexes, Possible mechanism reactions, Ligand displacement reaction in octahedral complexes, acid hydrolysis, Base hydrolysis
- Electron transfer reaction, mechanism of redox reaction, mechanism of substitution in square plannar complexes

UNIT- II : Organo Metallic Compounds

- Definition
- Types of O.M.C.
- Classification
- Nomenclature of O.M.C
- Structure and bonding in dihapto and metal olifines complexes. e.g. Ziese's salt complexes, ferrocine structure
- O.M.C. of Li and Al complexes

UNIT- III : Corrosion

- Principle of corrosion
- Types of corrosion
- (i) Wet corrosion
- (II) Galvanic corrosion
- (III) Atmospheric corrosion
- (IV) Pitting corrosion
- (V) Inner granual corrosion
- (VI) Dezincfication
- Prevention of corrosion: Inhibitors- Definition, type and use of inhibitors.

Books Suggested (Inorganic Chemistry):

1. Valance and molecular structure by Cartmell and Flower.
2. Text book of Inorganic Chemistry by Durent and Durent

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3. Inorganic Chemistry by S. Chand. જૂન–૨૦૧૩ થી

4. Advance Inorganic Chemistry Vol-II Satya Prakash (S.Chand)

5. Concise Inorganic chemistry by J.D.Lee.

6. Metalic Corrosion By M.N. Desai

7. Advance Inorganic Chemistry J.E. Huhee.

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B.Sc Chemistry

Semester : V

જૂન–૨૦૧૩ થી

Organic Chemistry

Paper : CC CH - 502

UNIT- I : Stereochemistry

- Conformational analysis of mono and di substituted cyclohexanes
- Molecular asymmetry as illustrated by allenes and diphenyls
- Isomerism of oximes.
- Determination of geometrical isomerism of Aldoxime.
- Determination of geometrical isomerism of Ketoxime(Beckmann's transformation)

UNIT- II

(A) Carbohydrates

- Introduction of Disaccharides
- Structure determination of
  (1) Sucrose
  (2) Maltose

(B) Isoprenoids

- Classification
- General methods of structure determination
- Isoprene rule
- Contitution of Citral and α-Terpeneol and their synthesis

UNIT- III : Nucleophilic substitution at saturated carbon atom

- The reaction mechanism
- Stereochemistry of nucleophilic substitution
- Scope of nucleophilic substitution
- Stereochemistry of SN^1 and SN^2 reaction
- Relative reactivity in substitution
- Solvent effect variation at carbon site
- Relative leaving group activity
- Neighboring group participation
- Competitive reactions. Elimination E_1,E_2 and E_{1cb} mechanisms

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Books Suggested (Organic Chemistry): જૂન–૨૦૧૩ થી

1. Organic chemistry by Morrison & Boyd Vth Edition
2. Advance organic chemistry by R.K.Bansal.
3. Organic chemistry by I.L.Finar Vol I &.II Vth Edition
4. Organic chemistry by pine, Hendrikson, Cram and Hammond IVth edition...
5. Outline of chemical technology by Dryden IInd Edition
6. Synthetic organic chemistry by Gurdeep R Chatwal.
7. Advanced organic chemistry by Jerry March.
8. Organic reactions and their mechanisms IInd edition by P.S. Kalsi.
9. Stereo chemistry: conformation and mechanism VIth edition by P.S.Kalsi.
10. Organic chemistry of natural product Vol: I & II by Gurdeep R. Chatwal.
11. Advanced organic chemistry by Arun Bahal and B.S. Bahal.
12. Organic chemistry Vol, I, II, III by S.M.Mukherjee, S.P.Singh, R.P.Kapoor.
13. Stereo Chemistry by Nasipuri.

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Physical Chemistry

Paper : CC CH – 503

UNIT- I : Electro Motive Force

- Chemical Cell: Without Transference with Transference Verification of Concentration cell and it's EMF equation.
- Electrolyte concentration cell
  Concentration cell without transference, Concentration cell with transference
- Electrode concentration cell
- Amalgam concentration cell, Gas Concentration Cell
- Liquid –Liquid junction potential
  Application of EMF measurements Determination of
- Degree of hydrolysis of salt
- Solubility of sparingly soluble salt
- Stability constant of complex,
- Dissociation constant of weak acid,
- Numericals

UNIT- II : Statistical Thermodynamics

- Introduction
- Combination and permutation
- Probability
- Sterling approximate formula (No Derivation)
- Type of Statistics
  - Maxwell-Boltzmann
  - Bose-Einstine Statistics
  - Fermi-Dirac Statistics
- Partition Function
  - Transnational Partition function
  - Rotational Partition function
  - Vibrantional Partition function
- Numericals

UNIT- III : Macromelecules

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- Classification of Polymers જૂન–૨૦૧૩ થી
- Tacticity of polymers. (Optical Isomers)
- Polymerization reaction with example
  - Addition Polymerization. (Polyethylene, Polystyrene,PVC)
  - Condensation Polymerization (Nylon-66, Dacron)
- Mechanisms of Polymerization
  - Free radical chain Polymerization
  - Anionic Polymerization
  - Cationic Polymerization
- Kinetics of Free radical chain Polymerization
- Degree of Polymerization
- Molar masses of Polymer
  - Number Average Molar Mass
  - Weight Average Molar Mass
- Determination of Molar Masses of Macro Molecules
  - Viscosity Method
  - Light Scattering Method
  - Numerical

Books Suggested (Physical Chemistry):-

1. Advance Physical Chemistry by Gurdeepraj.
2. Physical Chemistry (Question and Answer) by R. N. Madan, G.D. Tuli, S.Chand.
3. Principal of Physical Chemistry by Puri, Sharma, Pathania.
4. Chemical Thermodynamics by R.P. Rastogi and R.R.Mishra.
5. Physical chemistry by atkins.
6. Essentials of Physical Chemistry by B. S. Bahal, Arun Bahal, G.D.Tuli,
7. Physical Chemistry by P.W. Atkins, 5th edn, Oxford 1994 7th edn-2002.
8. Physical Chemistry by R.A. Albern and R.J.Silby, John Wiley 1995.
9. Physical Chemistry by G.H. Barrow, 5th edn, Mac Graw Hill, 1988,6th edn, 1996.
10. Physical Chemistry by W.J.Moore, 4th edn, Orient Longmans 1969.

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Semester : V જૂન–૨૦૧૩ થી

Structural – Analytical Chemistry

Paper : CC CH - 504

UNIT:- I : Symmetry of molecules

- Symmetry elements & symmetry operations
- Multiplications of symmetry operations
- Multiplication table for C_{2v}, C_{3v}, C_{2h} point groups only
- Classification of schoonflies point groups
- Determination of schoonflies point groups natations
- Symmetry & optical activity
- Symmetry property of orbital's for C_{2v}, C_{3v}, C_{2h} point groups

UNIT- II : NMR spectroscopy

- Introduction
- Proton magnetic resonance (1H NMR) spectroscopy
- Equivalent and non equivalent protons
- Nuclear shielding & de-sheilding
- Chemical shift & molecular structure
- Spin-spin splitting and coupling constant
- Area of signals
- Interpretations of PMR spectra
  Simple organic molecule such as ;
  (1) Ethyl bromide (2) Ethanol (3) Acetaldehyde (4) 1,1,2-Try bromo ethane (5) Ethyl acetate (6) Toluene (7) Acetophenone (8) Iso propyle Benzene (9) Acetic acid (10) Phenitol

UNIT:- III : Acid- base titration

- Construction of titration curves
- Feasibility of titration of poly protic acid
- Analysis of mixture of acid & base
- Differential titration of alkalis
- Gran's plot
- Buffers , buffer level , buffer range & buffer capacity

Suggested books: (structural chemistry)

1. Chemical application of group theory by F.A.Cotton
2. Chemical bonding and introduction by K.C.Patel, R.D.Patel and Raval
3. Application of group theory to chemistry by Bhattacharya

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4. Symmetry in chemistry by Jafle and Orchin
5. Advance inorganic chemistry by cotton & Wilkinson
6. Basic principles of spectroscopy by R.Chand
7. Organic chemistry Vol. 1 by S.M.Mukherji, S.P.Shingh, Kapoor
8. Spectroscopy organic compounds VIth edition by P.S.kalsi
9. Organic chemistry by Morrison and Boyd
10. Spectrometric identification of organic compounds IVth edition by Silverstain, Bassler and Morrill.
11. Application of absorption spectroscopy of organic compounds by John R. Dyer
12. Spectroscopic method in organic chemistry Vth edition by Dudley H. Williams & Ian Fleming
13. Physical methods for chemist Ruwssell S. Drago
14. Organic spectroscopy by Williams & Kemp
15. Organic spectroscopy by V.R.Dani
16. Qualitative Analysis R.A.Day & A.L.Underwood
17. Analytical Chemistry G.D. Christain
18. Fundamentals of Analytical Chemistry D.A.Skoog, D.M. West & F.J.Holler
19. Principales of Analytical Chemistry J.H. Kennedy
20. Analytical Chemistry – Principals & Techniques L.G.Hargis

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B. Sc. Chemistry

Semester : V જૂન–૨૦૧૩ થી

Synthetic Dyes

Paper : SE CH – 505 A

UNIT :- I :

- Introduction
- Synthetic Dyes
- Chromophores, Chromogens, Oxochroms, Bathochromic shieft, Hypsochromic shieft
- Difference between Dyes and Pigments
- Classification of Dyes
  - According to constitution
  - According to method of coloring the fibres
- Optical Brightners

UNIT :- II : Synthesis and uses

- Congo Red
- Eosin
- Alizarin
- Crystal violet
- Indigo
- Sefronine –T
- Methylene Blue
- Ereochrom Black –T
- Rhodamine
- Rosanilin

References Books :

1. Synthetic Dyes by Venkatramanan
2. Synthetic Dyes by G.R.Chatwal
3. Synthetic Dyes and Drugs by O.P.Agrawal
4. Synthetic Dyes by O. D. Tyagi & M. Yadav
5. Sanshlesit Rangako, Granth Nirman Board

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Semester : V જૂન–૨૦૧૩ થી

Oils, Fats and Waxes

Paper : SE CH – 505 B

UNIT:- I : Oils, Fats, and Waxes

- Introduction
- Distinction between oils and fats properties
- Classification
- Vegetable oils
- Manufacture of cotton seed oil by expression and solvent extraction
- Manufacture of soybean oil by solvent extraction
- Refining of crude vegetable oils
- Some other vegetable oils
- Animal oils, animal fats and oils
- Processing of animal fats and oils
- Mineral oils
- Difference between animal, vegetable and mineral oils
- Essential oils
- Isolation and uses of essential oils
- Waxes
- Classification of waxes
- Properties of waxes
- Some common waxes
- Qualitative solubility of waxes

UNIT:- II : Analysis of Oils, Fats and Waxes

- Saponification value
- Ester value
- Acid value
- Iodine value-wijs methods
- Richert meissl value

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- Henher value જૂન–૨૦૧૩ થી
- Elaiden test
- Aniline point
- Hydrogenation of oils
- Optimum conditions for the Hydrogenation process
- The dry process
- The wet process
- Manufacture of candles

Reference Books :

1. Industrial Chemistry By B. K. Sharma
2. Dryden's Outlines of Chemical Technology, 3rd Edition , East-West Press

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- **Semester : V** જૂન–૨૦૧૩ થી

Paints and Varnishes

Paper : SE CH – 505 C

UNIT:- I : Paints

- Historical background of Paint : Natural and synthetic
- Main Components of Paints
  - Pigments
  - Vehicle or medium
  - Thinners
  - Driers
  - Fillers
  - Plasticizers
- Different Color changing paint
- Art and use of Paint : Methods of Application of Paints
- Various Application of Paint
- Failure of a paint: Chalking, Fracking, Cracking, Blistering, Change of colour
- Prevention of failure of Paint FILM
- Synthesis of oil soluble dyes: Red, orange, blue
- Emulsion Paints; Cement Paints; Distempers

UNIT:- II : Varnishes

- History
- Components of classic varnish:-: Drying oil; Resin, Turpentine or solvent.
- Characteristics of good varnishes
- Types of Varnish
  - Violin
  - Resin
  - Shellac
  - Alkyd

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- Spar varnish જૂન–૨૦૧૩ થી
- Drying Oils
- Polyurethane
- Enamles
- Lacquer
- Acrylic

- Differentiate between paint and varnish

References Books :

1. Industrial Chemistry by B.K.Sharma

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Cosmetic Chemistry

Paper : SE CH – 505 D

UNIT:- I : Introduction to Cosmetics

- What are cosmetics?
- Analysis of cosmetics (Name the methods only)
  - Separation of the components
  - Identification of the ingredients
  - Quantitative determination of these ingredients
- Types of the cosmetics-Definition, Compositions and uses
  - Lipsticks
  - Nail enamels
  - Shampoos and soaps
  - Deodorants and antiperspirants
  - Hair sprays
  - Sunscreens
  - Cream, Lotions and Talcum powder
  - Hair dyes
- Name of the leading producers in cosmetics

UNIT:- II : Cosmetics and health

- pH of the cosmetic products
- Preservatives - botanical, parabens and formaldehyde releasing
- Toxic chemicals used as a ingredients
  - Antibacterials (triclosan)
  - Butylacetate
  - Butylated hydroxyl toluene
  - Coaltar
  - Diethanolamine
  - 1,4-dioxane
  - Formaldehyde
- Indian standards for the various cosmetic products

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Reference Books: જુન–૨૦૧૩ થી

1. Herbal cosmeticshandbook by H panda, Asia pacific business press publications
2. Org. chem. for cosmetic chemists by Anthony and Thomas, Allured publishing house
3. Beginning cosmetic chemistry by Randy scheuller and Pery romanoswaki, Allured publishing house
4. Encyclopedia of Industrial Chemical Analysis vol-11, Wiley publishers

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Metallurgy

Paper : SE CH – 505 E

UNIT:- I :

- Introduction
- Occurrence of Metals
- Mineral wealth of India
- Ore dressing
  - Gravity Separation (Hydraulic washing)
  - Froth flotation method
  - Magnetic Separation Method
- Production of the metal
  - Calcination
  - Roasting
  - Smelting and Reduction of the metal oxide

UNIT:- II :

- Purification of the Metals :
  - Electrolysis
  - Metal refining by Complexation
  - Van Artel
  - deboer method
  - Bassemerisation
  - Zone Refining
- Microbial Metallurgy
- Advantages of Microbial Metallurgy
- Extraction,Separation and Purification of Al and Ge from its Ore

References Books :

1. Inorganic Chemistry by R. Gopalan pp 567-590
2. Textbook of Inorganic Chemistry, by P.L.Soni

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Laboratory Course

LC CH - 507

(Inorganic, Organic, Physical Chemistry)

This syllabus is to be completed by assigning four laboratory session per week, each of Three periods. The number of students in the laboratory batch should not exceed fifteen (15) the medium of instruction will be English in laboratory course

Inorganic Chemistry practical

(A) Alloy

1) Brass alloy ------- Zn (Gravimetric) and Cu (Volumetric)
2) German silver alloy ------Ni (Gravimetric) and Cu (Volumetric)
3) Bronze alloy ------Sn (Gravimetric) and Cu (Volumetric)

(B) Synthesis by Convention Method

1) Ferrous Sulphate or Green vitriol ($FeSO_4$ $7H_2O$)
2) Sodium cobaltinitrate Na_3 $[Co(No_2)_6]$
3) Tetra amine cupric sulphate
4) Hexa thio urea plumbous nitrate
5) Cuprous chloride

Organic Chemistry practical

(A) Qualitative Analysis (Minimum 08)

Analysis of an organic mixture containing two components using water, $NaHCO_3$, NaOH, HCl for Separation /or using distillation process for separation and identification with the Preparation of Suitable derivatives.

Soluble Components:- Oxalic Acid, Succinic Acid, Resorcinol, Urea, Thio Urea

Separation of two components from Organic Mixture Such as….

Solid-Solid ------Mixture

Solid- Liquid -------Mixture

Liquid-Liquid ------ Mixture

[Liquid component must be neutral in nature]

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Physical Chemistry practical

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[A] Instruments: (Minimum 05)

1. To determine normality and amount of HCl and CH_3COOH in the given solution by Conductometric titration against 0.2N (exact) NaOH solution.
2. To determine the solubility product and solubility of springly soluble salts $PbSO_4$ by Conductometry.
3. To determine Normality and amount of each acid in the given mixture of HCl + CH_3COOH by pH metrically.
4. To determine the strength of strong and weak acid in a given mixture by Potentiometric titration using 0.1 N NaOH
5. To determine the concentration of Nickel in the given solution by Colourimetric estimation.
6. To determine the concentration of unknown solution from given $KMnO_4$ solution by Colourimetry.

[B] Kintetics & Distributions: (Minimum 03)

7. To determine the order of the reaction between $K_2S_2O_8$ and KI.
8. To determine the order of the reaction between H_2O_2 and HI.
9. To determine the distribution coefficient of Iodine between $CCl_4/CHCl_3$.& water at a given temperature.
10. To study the distribution of Benzoic acid between Benzene and water at room temperature and prove the dimerization of Benzoic acid in Benzene.

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Pattern of University Practical Exam

Time: 10:30am to 6:00pm (Including 30 minutes recess) **Total Marks: 200**

First Day

(A) Inorganic (50 marks)

-Estimation from Alloy (30 marks) and Inorganic Preparation (20 marks)

(B) Organic (50 marks)

- Qualitative analysis of an organic mixture.

Second Day

(C) Physical (50 marks)

- Any one exercise should be selected for each candidate from syllabus.

(D) Viva-Voce and Journal

- **Viva-Voce on practical base (40 marks)**

  - Inorganic ……13 marks
  - Organic ……...13 marks
  - Physical ……..14 marks

- **Journal (10 marks)**

➢ **Note: Certified practical journal is compulsory for practical exam.**

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Suggested batch distribution for practical exam

First Day:

10:30am to 2:00pm	2:30pm to 6:00pm
Inorganic: A Organic: B Physical: C	Inorganic: B Organic: C Physical: A

Second Day :

10:30am to 2:00pm	2:30pm to 6:00pm
Inorganic: C	Inorganic viva- All students (A,B & C batch)
Organic: A	Organic viva- All students (A,B & C batch)
Physical: B	Physical viva- All students (A,B & C batch)

Batch distribution (for 24 students)

A = 1 to 8
B = 9 to 16
C = 17 to 24

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BIO-
TECHNOLOGY

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BACHELOR OF SCIENCE (B.SC.)
IN
BIOTECHNOLOGY

w.e.f. from June 2013

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B.Sc. Programme with 144 credits

CBCS-Semester-Grading Pattern

Part/Class	Subject code	Study components	Instructions Hrs / week	Examination			Credit
				Internal	University Exam	Total	
Sem-V B.Sc.		**Semester V**					
		Core compulsory (CC) Course					
	CC-I-7	Core Course-I (Paper-7)	3	30	70	100	3
	CC-I-8	Core Course-I (Paper-8)	3	30	70	100	3
	CC-II-9	Core Course-II (Paper-9)	3	30	70	100	3
	CC-II-10	Core Course-II (Paper-10)	3	30	70	100	3
		Practical Core (PC) Course					
	PC-I-7,8,9 & 10	Practical Core Course-I (Paper-7,8,9 & 10)	12		200	200	6
		Foundation Course (FC)					
	FC-31	Compulsory English (L.L.)	2	15	35	50	2
		Elective Course (E)					
	EG-31	Elective (**Generic**) Course	2		50	50	2
	ES-3	Elective (**Subject**) Course	2		50	50	2
			30	**135**	**615**	**750**	**24**

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Part/Class	Subject code	Study components	Instructions Hrs / week	Examination			Credit
				Internal	University Exam	Total	
Sem-VI B.Sc.		**Semester VI**					
		Core compulsory (CC) Course					
	CC-I-11	Core Course-I (Paper-11)	3	30	70	100	3
	CC-I-12	Core Course-I (Paper-12)	3	30	70	100	3
	CC-II-13	Core Course-II (Paper-13)	3	30	70	100	3
	CC-II-14	Core Course-II (Paper-14)	3	30	70	100	3
		Practical Core (PC) Course					
	PC-I-11,12,13 & 14	Practical Core Course-I (Paper-11,12,13 & 14)	12		200	200	6
		Foundation Course (FC)					
	FC-32	Compulsory English (L.L.)	2	15	35	50	2
		Elective Course (E)					
	EG-32	Elective (**Generic**) Course	2		50	50	2
	ES-32	Elective (**Subject**) Course	2		50	50	2
			30	**135**	**615**	**750**	**24**

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B.SC. BIOTECHNOLOGY

SEM 5

CC-I-7

PAPER-7

BIOPROCESS AND BIOCHEMICAL ENGINEERING

UNIT-1

- Primary and secondary screening.
- Strain Improvement : Nature of mutation, mutagenesis, isolation of mutants.
- Strain Improvement : Application of recombinant DNA technique in strain construction.
- Techniques for preservation and storage of cultures.

UNIT-2

- Fermenter and bioreactor : Design and types of various fermenters.
- Introduction to Aeration and agitation.
- Basic concept of growth.
- Batch, fed-batch and continuous culture operations, chemostat and turbidostat.
- Starter culture, its importance and preparation.

UNIT-3

- Introduction and types of fermentation media
- Raw materials used in fermentation media.
- Media optimization.
- Sterilization of media, air and equipments.

UNIT-4

- Overview of downstream processing.
- Fermentation economics.
- Fermentation process of alcohol.
- Fermentation process of antibiotic (penicillin).

REFERENCES

- L.E. Casida. Industrial Microbiology by.

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- Stanbury and Whitaker. Principles of f ermentation technology.
- Sikyta. Methods in Industrial microbiolo gy. Ellis Hardwood Ltd.
- Krysman. Product recovery in bioprocess technology.
- T.K. Ghose. Bioprocess computation in biotechnology, Ellis Hardwood Ltd.
- Demain et al. (ED) 1999. Manual of industrial Microbiology and Bio technology. Asin Press.
- Doran (D). Bioprocess Engineering Principles; Academic Press, 1998.
- Cooney, A.E. Humphrey, Comprehensive Biotechnology : The principles and Regulation of Biotechnology in Industry, Agriculture and Medicine. Vol.2, Pergamon Press, 1985.

B.SC. BIOTECHNOLOGY

SEM 5

CC-I-8

PAPER-8

MOLECULAR GENETICS

UNIT-1

- Overview of nucleic acids.
- Alternative forms of DNA.
- Genomic organization of prokaryotic and eukaryotic cells.
- DNA as genetic material : Experimental evidences - Transformation principles, Viruses, Watson and Crick Model.
- Concept of central dogma.

UNIT-2

- Enzymes involved in DNA replication.
- Process of replication : Initiation, Elongation and Termination.
- Replication of entire DNA molecule; Distinguishing features of DNA replication between prokaryotes and eukaryotes.

UNIT-3

- Types of RNA molecules.
- Transcription-Initiation; RNA polymerase; elongation and termination, the distinguishing features of the processes in prokaryotes and enkaryotes.
- RNA Processing
- The genetic code

UNIT-4

- Translation-Initiation, elongation and termination of translation.
- Post translational modifications.
- Regulation of gene expression, lac-operon.
- Transposable elements : Structure and mechanism of transposition, and Transposable elements.
- RNA interference : a mode of gene regulation.

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REFERENCES

- Lewin B. (2000) Gene VIL IRL Press, Oxford University Pres s Oxford.
- Watson, J.D., Hopkins, Roberts, Stiez, Weiner. (1987) Molecular Biology of the Gene. (4 th Ed) The Benjamin/Cummings Publishing Co. Inc. California.
- Davis, D.B. Dulbecco, R., Risen, H.N, Ginsberg. H.S., (1990) Microbiology, (4 th Ed) Harper & Row Publishers, Singapore.
- T.A. Brown Genome.
- S.B. Primrose Principle of gene manipulation .

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B.SC. BIOTECHNOLOGY

SEM 5

CC-I-9

PAPER-9

Principles of Biotechnology Applied to Plants

UNIT-1

- Principles of tissue culture : Historical perspectives and development of plant tissue culture techniques.
- Cell growth and differentiation – morphogenesis.
- Concepts of totipotency of cells.
- Laboratory requirements for tissue culture.

UNIT-2

- Culture media : preparations / constituents and concepts of sterilization.
- Preparation, Isolation and selection of explants.
- Liquid cell suspension cultures; Pollen culture and protoplast culture production and uses of haploids.

UNIT-3

- Gene transfer techniques using Agro bacterium.
- DNA mediated gene transfer, basics of GMO.
- Transgenic plants.
- Crop improvement (viral resistance, insect resistance, microbial resistance, herbicide, tolerance and stress resistance).

UNIT-4

- Preservation techniques of germplasm.
- Plant tissue culture and secondary metabolite production.
- Production of synthetic seeds.
- BT cotton.

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REFERENCES

- H.S. Chawla. Introduction to Plant Biotechnology
- Iganacimatha. Basic biotechnology.
- Das and Mookerjee. Outline of biology.
- David Bourgaize. Biotechnology, Demystifying the concepts. Alp. 2000 .
- Eric. S. Grace. Biotechnology unzippe d : Promises and realities.
- Cohn and Stumph. Outline of Biochemistry, Wiley eastern.
- Miglani. Dictionary of plant genetics and molecular biology. Viva Books.
- Iganacimatha. Appl. Plant Biotechnology.
- K.K. De. Plant tissue culture.
- Radint and Bhojwani. Plan t and tissue culture.
- Dixon and Gonzales. Plant cell culture. A practical approach. IRL press.
- Verpoorte, R. (Ed.) 2000. Metabolic engineering of plant secondary methabolism.
- Bernard, R. Glick and Pasternak. Molecular biotechnology.
- Bulter and Dawson. Cell culture.

B.SC. BIOTECHNOLOGY

SEM 5

CC-I-10

PAPER-10

Principles of Biotechnology Applied to Animals

UNIT-1

- Animal Tissue Culture: History and Scope of Animal Tissue Culture.
- Culture media, Natural and chemically defined media, Serum and Serum free media, other supplements in media and their use.
- Primary cultures: Primary Cultures, Cell lines and Its Maintenance.
- Finite and Continuous cell lines, Tissue Disaggregating by Mechanical and Enzymatic methods, Subculturing.

UNIT-2

- Secondary Culture – transformed animal cells and continuous cell lines.
- Organ Culture : Methods of Organ culture, utility of organ culture, Culture of adult organs.
- Cryopreservation and transport of animal tissue and cell lines.
- Bioreactors: Bioreactor for large scale culture of cells.

UNIT-3

- Expression vector for Animal cell.
- Expression of Cloned proteins in animal cell.
- Overproduction and downstream processing of the expressed proteins.
- Cloning : Overview, Methods of Cloning, Application and Ethics, *In vitro* fertilization and embryo transfer, Application.

UNIT-4

- Hybridoma Technology : Hybridoma and monoclonal antibodies, Production, Methods, Types of Monoclonal Antibodies & Applications.
- Vaccines: Production of Vaccines in animal Cells, Methodology, Application and limitation.
- Transgenic animals: Techniques for the production of Transgenic Mice, Fish and ship, Products produced from Transgenic Animals.

- Stem Cell Technology: Overview and Types of Stem Cell, Characteristics of Stem Cell, Application of Stem cell in Therapy.

REFERENCES

- Iganacimatha. Basic biotechnology.
- Das and Mookerjee. Outline of biology.
- Roy and De. Cell biology.
- David Bourgaize. Biotechnology, Demystifying the concepts. Alp. 2000.
- Eric. S. Grace. Biotechnology unzipped : Promises and realities .
- Jan kav. Introduction to Animal physiology. Viva Books.
- Babinnk and philips. 1989. Animal Biotechnology. Pergamonn.
- Gibert. Developmental biology.
- Jenklus N. 1999. Animal cell biotechnology. Methods and protocols Human a press.
- Butler and Walter, 1997. Animal cell cultures an d technology : The basics. IRL press.
- Masters JRW (ED.) Animal cell culture : A practical approach. 2000. OUP.
- Elements of Biotechnology : P.K. Gupta.
- Molecular biotechnology : Bernard, R. Glick and Pasternak.
- Animal cell culture : Morgan.
- Cell culture : Bulter and Dawson.

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B.Sc. BIOTECHNOLOGY

Elective Course (EC)(Subjective)

Semester- 5

Paper : ECOLOGY AND ECOSYSTEMS

UNIT-1

- Terrestrial Biomes – Grasslands and Forests.
- Aquatic Biomes – Freshwater and Saline water.
- Biogeochemical Cycles – Carbon and Nitrogen cycle.
- Interaction Within, Between and Among Populations.

UNIT-2

- Experimental Ecosystem Models – Batch system, Flow-Through system.
- Experimental Ecosystem Models – Microcosms.
- Microbes within Macro-communities.
- Structure and Function of some Microbial Co mmunities.

B.Sc. BIOTECHNOLOGY

Elective Course (EC)(Subjective)

Semester- 5

Paper : INDUSTRIAL BIOTECHNOLOGY

UNIT-1

- Fermentation processes of Amylase .
- Fermentation processes of Protease.
- Fermentation processes of Citric acid.
- Fermentation processes of Streptomycin.

UNIT-2

- Fermentation processes of l-Lysine.
- Fermentation processes of Vitamin-B_{12}.
- Mushrooms.
- Single Cell Protein.

B.Sc. BIOTECHNOLOGY

PRACTICAL CORE COURSE

(PAPER-7, 8, 9 & 10)

SEMESTER-5

LIST OF EXPERIMENTS

1. Isolation, Screening and cha racterization of Amylolytic microbes and Enzymes.
2. Isolation, Screening and characterization of Proteolytic microbes and Enzymes.
3. Isolation, Screening and characterization of Lipolytic microbes and Enzymes.
4. Screening of antibiotic producing microor ganisms by Crowded Plate Technique.
5. Screening of antibiotic producing microorganisms by Wilkin's method.
6. Bioassay of Penicillin.
7. Optimization of medium parameters for the production of Biomass.
8. Optimization of medium parameters for the producti on Enzyme (Amylases).
9. Typical fermentation of Alcohol.
10. Typical fermentation of Gluconic acid.
11. Isolation of antibiotic resistant mutant(s) bacterium by direct selection (Gradient Plate Technique)
12. Isolation of antibiotic resistant mutant(s) b acterium by indirect selection (Replica Plate Technique)
13. Sterility testing.
14. Sterilization and related techniques used in tissue culture.
    - Autoclaving
    - Hot Air Oven
    - Filter Sterilization
    - Surface sterilization
    - Laminar Air Flow.
15. Preparation of Media and media composition.
16. Introduction of explants for Callusing.
17. Characterization of Callus.
18. Sub culturing of Callus.
19. Isolation of genomic DNA from bact erial cells.
20. Isolation of plasmid DNA.

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PHYSICS

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HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY PATAN-384 265

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

SYLLABUS

B.Sc. Semesters- V & VI

Total Pages: **1 to 31**

Submitted on

Date:

Chairman

B.O.S. PHYSICS

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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-V&VI 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.

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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**

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.

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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.

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 four practicals (each from PC-501 to PC-504 for Sem-V & PC-601 to PC-404 for Sem-VI) each of 50 marks (35-marks for practical+15marks for Viva) and duration of each practical will be 3 hours. Numbers of student in a practical exam will be 16 per batch and examiners will be 2.

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6. It will be compulsory for a candidate to obtain passing percentage in both Internal as well as External Evaluation. The passing marks 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.

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN

B.Sc. Programme with 144 credits

CBCS-Semester-Grading Pattern

w.e.f. June-2013

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

Part/Class	Course	Study Components	Instruction Hrs/ Week	Examination			Credit
				Internal	Uni. Exam	Total	
B. Sc. Sem –V		**Semester-V**					
		Core Compulsory (CC) Course					
	CC-I- 7	Core Course-I (Paper-7)	3	30	70	100	3
	CC-I- 8	Core Course-I (Paper-8)	3	30	70	100	3
	CC-I- 9	Core Course-I(Paper-9)	3	30	70	100	3
	CC-I-10	Core Course-I(Paper-10)	3	30	70	100	3
		Practical Core (PC) Course					
	PC-I- 7	Practical Core Course-I (Paper-7)	3		50	50	1.5
	PC-I- 8	Practical Core Course-I (Paper-8)	3		50	50	1.5
	PC-I- 9	Practical Core Course-I(Paper-9)	3		50	50	1.5
	PC-I-10	Practical Core Course-I(Paper-10)	3		50	50	1.5
		Foundation Course (FC)					
	FC-5	Foundation (**Generic**) Course – V Compulsory English (L.L.)	2	30	70	100	2
		Elective Course (E)					
	EG-5	Elective (**Generic**) Course –V	2		50	50	2
	ES-5	Elective (**Subject**) Course –V	2		50	50	2
			30	**150**	**650**	**800**	**24**

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B. Sc. Sem-VI		**Semester-VI**					
		Core Compulsory (CC)Course					
	CC-I- 11	Core Course-I (Paper-11)	3	30	70	100	3
	CC-I- 12	Core Course-I (Paper-12)	3	30	70	100	3
	CC-I-13	Core Course-II (Paper-13)	3	30	70	100	3
	CC-I-14	Core Course-II (Paper-14)	3	30	70	100	3
		Practical Core (PC) Course					
	PC-I- 11	Practical Core Course-I (Paper-11)	3		50	50	1.5
	PC-I- 12	Practical Core Course-I (Paper-12)	3		50	50	1.5
	PC-I-13	Practical Core Course-II (Paper-13)	3		50	50	1.5
	PC-I-14	Practical Core Course-II (Paper-14)	3		50	50	1.5
		Foundation Course (FC)					
	FC-6	Foundation (**Generic**) Course – VI Compulsory English (L.L.)	2	30	70	100	2
		Elective Course (E)					
	EG-6	Elective (**Generic**) Course –VI	2		50	50	2
	ES-6	Elective (**Subject**) Course –VI	2		50	50	2
			30	**150**	**650**	**800**	**24**

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

Semester end Examination (Sem-V & VI)

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

Semester end Examination (Sem-V & VI)

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-V

PHYSICS SYLLABUS

CC: PHY-501

UNIT - I Mathematical Physics

(a) Differential Equations

Some partial differential Equations Physics (2.1), The method of separation of variables (2.2A), Separation of Helmholtz equation in Cartesian Coordinates (2.2B), Separation of Helmholtz equation in spherical polar Coordinates (2.2C), separation of Helmholtz equation in cylindrical coordinates(2.2D), Laplace's equation in various coordinate systems (2.2E).

(b) Second order differential Equations

Ordinary and singular points (3.1). Series solution around and ordinary point (3.2), Series Solution around a regular singular point (The method of Forbenius) (3.3).

Basic Reference : Mathematical Physics by P. K. Chatopadhyay. Wiley East Ltd.

Other References:

1. Mathematical Physics by B.D.Gupta.

2. Mathematical Physics by H.K.Dass.

UNIT- II CLASSICAL MECHANICS

(a) Lagrangian Formulation

Constraints (8.1), generalized coordinates (8.2), D'aleffibert's principle (8.3), Lagrange's equation

ns (8.4), A general expression for kinetic energy (8.5), Symmetries and the laws of conservation (8.6), Cyclic or ignorable coordinates (8.7), Velocity dependent potential of electromagnatic field (8.8)

(b) Motion of Rigid Body

Euler's theorem (10.1), Angular momentum and kinetic energy (10.2), The inertia tensor (10.3), Euler's equation motion (10.4).

Basic Reference: Introduction to classical mechanics by Takawale and Puranic. THM Publication.

Other References :

1. Classical Mechanics, by Goldstein. Narosa Publishing House, New Delhi.
2. Classical Mechanics by Yasvant Waghmare.
3. Classical Mechanics by N.C.Rana and P.S.Joag, THM

UNIT -III QUANTUM MECHANICS

General formalism of Wave Mechanics

The Schrodinger equation and Probability interaction for N- particle system (3.1), The fundamental postulates of wave mechanics (3.2), Adjoint of an operator and self Adjointness, (3.3), The Eigen value problem (3.4), Degenrecy (3.5), Eigen values and Eigen functions of self-adjoint operators (3.6), The Dirac delta function (3.7), Observables, completeness and normalization of Eigen functions (3.8), Closer, physical interpretation of Eigen values, Eigen function and expansion coefficients (3.9), Momentum eigen functions : wave functions in momentum space (3.10), uncertainly Principle (3.11), States with minimum value for uncertainly product (3.12), commuting observable : Removal of degeneracy (3.13). Evolution of system with time Constants of the motion (3.14).

Basic Reference : A text book of Quantum Mechanics by P.M. Methews and K. Venkateshan, THM.

Other References :

1. Quantum Mechanics by Ghatak and Loknathan, The Macmillan company of India Limited.
2. Quantum Mechanics by Fschwabi, Narosa Publishing House, New Delhi.
3. Quantum Mechanics by John, L. Powell and B. Crasemann.
4. Quantum Mechanics by Schiff.

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CBCS - Semester - Grading Pattern
B.Sc. Semester-V
PHYSICS SYLLABUS

CC: PHY-502

UNIT- I STATISTICAL MECHANICS

(a) Macroscopic and Microscopic states
Macroscopic States (4.1), Microscopic States (4.2), Phase Space (4.3), μ-Space (4.4), τ-Space (4.5), Postulate of equal a priori probability (4.6).

(b) Statistical Ensembles
Micro canonical ensemble (5.1), Canonical ensemble (5.2), Alternative method for the derivation of canonical distribution (5.3), Mean value and Fluctuations (5.4), Grand Canonical Ensemble(5.5), Alternative derivation of Grand Canonical Distribution(5.6), Fluctuations in the number of particle of a system in a grand canonical ensemble(5.7), Reduction of a Gibb's distribution to Maxwell's and Boltzman distribution(5.8), Barometric formula (5.9), Experimental verification of the Boltzman's distribution (5.10).

Basic Reference : Fundamentals of Statistical Mechanics by B. B. Laud. New Age International Publisher (copy right 1998)

Other Reference :
Statistical Mechanics and Properties of Matter by E.S.R.Gopa

UNIT-II SOLID STATE PHYSICS

(a) Free Electron Theory of Metal
Thermal conductivity of metals(6.1.2), The F.D. distribution function(6.3), The Sommerfield Model(6.4), Density of states(6.4.1), The free electron gas at 0° K(6.4.2), Energy of electron at 0° K(6.4.3), The electron heat capacity(6.5), The Sommerfield Theory of conduction in metals(6.6), The Hall coefficient(6.6.1).

(b) Application to Plasmons, Polaritons and Polarons

(Note: Qualitative description of dielectric constant ϵ(W) should be given equation 10.45 and 10.49) Application to Plasma(10.7), Plasma ossilations(10.7.1), Transeverse optical mode in plasma(10.7.2), Application to optical phonon modes in ionic crystals(10.8), The longitudinal

optical mode(10.8.1), Transeverse optical mode(10.8.2), The interaction of electromagnetic waves with optical modes(10.9).

Basic Reference: Elements of Solid State Physics by J.P. Srivastava,PHI New Delhi 2003

Other References :

1. Solid State Physics by A. J. Dekker.
2.Introduction to Solid State Physics by C. Kittel. 7th Edition, John Willy and Sons

UNIT- III PLASMA PHYSICS

(a) Characteristics of a Plasma in a Magnetic field
Description of plasma as a gas mixture, (3.1), Properties of plasma in magnetic field (3.2), Force on plasma in magnetic field (3.3), Current in Magnetised Plasma (3.4), Diffusion in a Magnetic field (3.5), Collisions in fully ionized magneto-plasma (3.6), Pinch Effect (3.7), Oscillations and waves in the plasma (3.8), Plasma frequency (3.8.1), Maxwell's equation in a homogenous plasma (3.8.2), Electromagnetic or Transverse Oscillations (3.8.3), Electostatic or Longitudinal oscillations ($B_a^{\rightarrow}=0$) (3.8.4), Oscillations of the plasma ($B_a^{\rightarrow}\neq0$)(3.8.5), Hydromagnetic waves (3.8.6), Resonances and cut-offs or reflection points (3.8.7).

(b) Applications of Plasma
Controlled Thermonuclear Reactions (7.1), Lawson criterion (7.1.1), The Coulumb Barrier (7.1.2), Heating and Confinment of the Plasma (7.1.3), Readiation loss of energy (7.1.4), Magnetohydrodymic conversion of energy (7.2), Plasma propulsion (7.3), Other plasma devices (7.4).

Basic Reference: Elements of Plasma Physics by S. N. Goswami New Central Book Agency (P). Ltd. Calcutta. reprint 2000.

Other References :

1. Introduction to Plasma Physics by F.F.Chen. Plenum Press.
2. Plasma Physics by S. N. Sen, Pragati Prakashan, Meerut.

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN

CBCS - Semester - Grading Pattern

B.Sc. Semester-V

PHYSICS SYLLABUS

CC: PHY-503

UNIT - I RADIO ACTIVITY

(a) Alpha Rays : Spectra and Decay

Range of Alpha Particles (4.II.1), Disintegration energy of the Spontaneous Alpha-Decay (4.II.2), Alpha-Decay Paradox-Barrier Penetration (4.II.3).

(b) Beta Rays : Spectra and Decay

Introduction (4.III.1), Continuous Beta ray spectrum-Difficulties in understanding it (4.III.2), Pauli's Neutrino Hypothesis (4.III.3), Fermi's theory of Beta-dacy (4.III.4), The Detection of Neutron (4.III.5).

(c) Gamma-Ray Emission:

Introduction (4. IV. 1), Gamma - ray emission - selection rules (4.IV.2), Internal conversion (4.IV.3).

Basic Reference :

Nuclear Physics (An Introduction) by S. B. Patel, Willey Eastern Ltd.

UNIT-II NUCLEAR PHYSICS

(a) Nuclear Energy:

Introduction (6.1), Neutron Induced Fission (6.2), Asymmetrical Fission-Mass Yield (6.3), Emission of Delayed Neutrons by Fission Fragments(6.4), Energy Released in the Fission of U--235 (6.5), Fission of Lighter Nuclei (6.6), Fission Chain Reaction (6.7), neutron cycle in a Thermal Nuclear Reactor (6.8), Nuclear Reactors (6.9).

Basic Reference :

Nuclear Physics (An Introduction) by S. B. Patel, Willey Eastern Ltd.

(b) Elementary Particles:

Leptons (14.4), Hadrons (14.5), Elementary particle quantum numbers (14.6), Isospin (14.7), Symmetries and- conservation principles, (14.8), Quarks (14.9), fundamental Interactions (14.10).

Basic Reference :

Nuclear Physics (An Introduction) by S. B. Patel, Willey Eastern Ltd.&

Concept of Modern Physics by A.Beiser. 5th edition , McGraw-Hill.(for (b))

UNIT-III MOLECULAR SPECTRA

(a) Pure Rotational and Vibrational - Rotational Spectra

Types of Molecular Spectra (17.2), Salient Features of Rotational Spectra (18.1), Molecular requirement for Rotational Spectra (18.2), Experimental Arrangement (18.3), The molecule as a rigid rotator: Explanation of rotational spectra (I8.4) The Non-rigid Rotator (18.5),The Isotope Effect (18.6), Salient Features of Vibrational-Rotational Spectra (19.1), The Molecule as a Harmonic Oscillator (19.2).

(b) Raman and Electronic Spectra

Nature of the Raman Effect (20.1), Experimental Arrangement for Raman Spectra (20.2), Classical Theory of Raman Effect (20.3), Quantum theory of Raman Effect (20.4), Raman Spectra and Molecular Structure (20.5), Infra-red Spectra Versus Raman Spectra (20.6), Salient Features of Molecular Electronic Spectra (21.1), Formation of Electronic Spectra (21.2).

Basic Reference:
Atomic & Molecular-Spectra by RajKumar, KedarNath RamNath, Delhi.

Other References:

1. Molecular spectroscopy by Herz-Berg.
2. Molecular spectroscopy by Banewell

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CBCS - Semester - Grading Pattern

B.Sc. Semester-V

PHYSICS SYLLABUS

CC: PHY-504

UNIT – I

(a) **Network Transformations:**
Principle of duality (1.3), Reduction of Complicated network (1.4), Conversions between T and π sections (1.5), The bridged-T network (1.6), The Lattice Network (1.7), The Reciprocity theorem (1.9), The compensation theorem (1.12), Driving point impedance, transfer impedance (1.14), The parallel-T network (1.17).

Basic Reference :

Networks, Lines and Fields by J. D.Ryder. Pretice Hall.

(b) **Photo Electric Devices and Thyristors**
Classification of Photoelectric devices (27.1), Photoconductive cells (27.10), Photovoltaic cells (27.11), SCR (26.1, 26.1.1 to 26.1.4), Triac (26.4), Diac (26.5)
Basic Reference :

Electronics and Radio Engineering by M. L. Gupta. 9th Enlarged Edition reprint 2002. Dhanpat Rai Publication Co.

UNIT - II

(a) **Basic Transistor Amplifiers:**
Current and Voltage amplifires (9,10), Common Emitter Amplifiers with Emitter Resistor (9.11), Simplified Common Emitter Hybrid Model (9.12), Effect of An Emitter Bypass Capacitor in low frequency Response.

(b) **Multistage Amplifiers**
Multistage Transistor Amplifiers (10.1), R-C- coupled Amplifiers (10.2), Transformer Coupled Amplifiers (10.3), Direct coupled Amplifiers (10.4), Effect of cascading on Band width (10.5).

Basic Reference :

Hand Book of Electronics by Gupta and Kumar. 30th revised Edition 2002.

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UNIT - III

(a) Regulated DC Power Supply

Transistor Series voltage Regulator (25.2.), Negative Feed back Voltage Regulator (25.3), Transistor Shunt Regulator (25.4), Transistor Current Regulator (25.5), Glow-tube Voltage regulator (25.6).

Basic Reference: Electronics and Radio Engineering by M. L. Gupta. 9th reprint 2002. Dhanpat Rai.

(b)Constants, Variables & Data Types: (**Programming in C)**

Introduction (2.1), Character Set (2.2), C Tokens(2.3), Keywords and Identifiers (2.4), Constants (2.5), Variables (2.6), Data Types (2.7), Declaration of Variables (2.8), Declaration of Storage Class (2.9), Assigning Values of Variables (2.10), Defining Symbolic Constants (2.11), Declaring a Variable as Constant (2.12), Declaring a Variable as Volatile (2.13), Overflow and Underflow of Data (2.14).

Basic Reference : Programming in ANSI C by E.Balaguruswami (THM) (3rd Edition)

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CBCS - Semester - Grading Pattern

B.Sc. Semester-V

PHYSICS SYLLABUS

LABORATORY EXPERIMENTS

PC: PHY-501

1. Acceleration due to gravity (g) using Kater's pendulum (with movable and fixed knife edges)
2. Determination of Thermal conductivity 'K' of a rubber tube.
3. Study of thermocouple
4. Velocity of sound in air using CRO
5. G.M. Counter (Plateau Characteristics)

PC: PHY-502

1. Refractive index ' μ ' by total internal Reflection method usingGauss eye piece
2. Resolving power of grating
3. To study absorption spectra of Iodine gas molecule
4. Newton's Ring (determination of R)
5. To study absorption spectra of liquid ($KMnO_4$)

PC: PHY-503

1. Comparison of capacity (C_1/C_2) using method of mixture
2. Measurement of frequency f and phase difference 'θ' of a.c wave using CRO
3. Calibration of magnetic field
4. Determination of M and H using Deflection and Vibrational Magnetometer
5. e/m Thomson method

PC: PHY-504

1. A study of transistorized Hartley Oscillator using CRO/Wave meter
2. I/P and O/P impedance of a R-C CE amplifier at different frequency using VTVM/CRO
3. A study of Transformer coupled Amplifier using VTVM/CRO (voltage gain frequency response and band width)
4. Diac characteristics
5. Characteristic of SCR

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CBCS - Semester - Grading Pattern

List of Elective (Subject) Courses For Vth and VIth Sem.

(in force from June 2011)

Credits-2

1. INSTRUMENTS

2. OPTOELECTRONIC INSTRUMENTS

3. PROGRAMMING IN FORTRAN 90 AND 95

4. REMOTE SENSING AND TRANSDUCERS

DETAIL SYLLABUS

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN

CBCS - Semester - Grading Pattern

B. Sc. :: PHYSICS :: SEMESTER-V & VI

ES PHY-07: INSTRUMENTS

UNIT-I

Michelson's Interferometer (15.7):-Principle, Construction, Working, Circular fringes ,Localized fringes, White light fringes, Visibility of fringes(15.7.1 to 15.7.7), Applications of Michelson Interferometer (15.8)-Measurement of wavelength, Determination of difference in the wavelengths of two waves, Thickness of a thin transparent sheet, Determination of the refractive index (15.8.1 to 15.8.4)

Babinet Compensator (20.21):-Construction(20.21.1), Production of polarized light (20.21.2), analysis of elliptically polarized light (20.21.3).

UNIT-II

C.R.O.:-CR Tube (3.5), Electrostatic Deflection Sensitivity (3.5.1), Magnetic Deflection Sensitivity (3.5.2), CRT connections (3.5.3), Uses of C.R.O. (3.5.4)

G. M. Counter: Principle, Construction, Working, Dead time, recovery time, True counting rate, Efficiency of counting, Quenching of G M counter, Operation and testing of G.M. counter, Plateau, Applications of GMC, Advantages and limitations of GMC.

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Basic references:

1. A textbook of Optics by Dr.N.Subrahmanyam, Brijlal and Dr.M.N. Avadhanulu, S. Chand & Co. (for M.I, B.C.)

2. Hand Book of Electronics by Gupta and Kumar. 30th revised Edition 2002.(for CRO)

3. Refresher Course in Physics Vol-III, S. Chand & Co. Ltd.(7th edition-2006) (for GMC,Ch-28)

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CBCS - Semester - Grading Pattern
B. Sc. :: PHYSICS :: SEMESTER-V & VI

ES PHY-08: OPTOELECTRONIC INSTRUMENTS

UNIT-I

Introduction (22.1), Attenuation of light in optical medium (22.2), Thermal Equilibrium (22.3), Interaction of light with matter (22.4 -22.4.1 to 22.4.4), Einstein relations (22.5), Light amplification (22.6-22.6.1 to 22.6.2), Population inversion (22.7), Active medium (22.8), Pumping (22.9), Metastable states (22.10), Principal pumping schemes (22.11-22.11.1 to 22.11.4), optical resonant cavity(22.12-22.12.1 to 22.12.3), Axial modes (22.13-22.13.1), Gain curve and laser operating frequencies (22.14), Transverse modes (22.15), Types of Lasers, Rubby Lasers, Helium-Neon Laser, (22.16), Applications (22.20).

Basic Reference: A textbook of Optics by Dr.N.Subrahmanyam, Brijlal and Dr.M.N. Avadhanulu, S. Chand & Co.

UNIT-II

Fabry- Parot Interferometer and Etalon (15.12), Formation of fringes, Determination of wavelength, Measurement of difference in wavelength (15.12.1 to 15.12.3)

Electron Microscope: Principle, electrostatic fousing, magnetic fousing, description, use of electron microscope. (page 204 to 213)

Basic references:

1. A textbook of Optics by Dr.N.Subrahmanyam, Brijlal and Dr.M.N. Avadhanulu, S. Chand & Co. (for F P)

2. Atomic Physics by J.B. Rajam, S.Chand&Co.(1960)(for Ele. Microscope)

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CBCS - Semester - Grading Pattern
B. Sc. :: PHYSICS :: SEMESTER-V & VI

ES PHY-09: PROGRAMMING IN FORTRAN 90 AND 95

UNIT-I

Introduction , Evolution of Fortran 90 (1.1), Writing a Program (2.1), Input Statement (2.2), Some Fortran 90 Program Examples (2.3), Constants (3.1), Scalar Variables (3.2), Declaring Variable names (3.3), Implicit Declaration (3.4), Named Constants (3.5).

UNIT-II

Arithmetic Operators and Modes of Expressions (4.1), Integer Expressions (4.2), Real Expressions (4.3), Precedence of Operations in Expressions (4.4), Examples of Arithmetic Expressions (4.5), Assignment Statements (4.6), Defining Variables (4.7), Some Problems due to Rounding of Real Numbers (4.8), Mixed Mode Expressions (4.9), Intrinsic Functions (4.10), Examples of use of Functions (4.11).

Basic Reference: COMPUTER PROGRAMMING IN FORTRAN 90 AND 95 by V. Rajaraman (Sept.-2008)) PHI, New Delhi.

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CBCS - Semester - Grading Pattern
B. Sc. :: PHYSICS :: SEMESTER-V & VI

ES PHY-10: REMOTE SENSING AND TRANSDUCERS

UNIT-I

Remote Sensing

Introduction, Beginning of Remote Sensing in India, History, Electromagnetic energy, Visible and non-visible radiation, Emission of EM radiation, Atmospheric effect, Solar constant Remote Sensing-a developing Science: Atmospheric Window, Human vision and Human Eye, Useful instruments, Micro-resolution, Photo-geometry.

New Technology: Detectors, Optical Sensors, Types of Optical Sensors, Optical mechanical sensor, Scanning radiometer, IR Scanner, Multi-spectra Scanner. TV, Radar and Slar systems, Applications of RS in different fields –Land set satellites, Earth resource satellites.

Basic Reference: 1. Remote Sensing by Suresh Shah (in Gujarati) Uni. Granth Nirman Board, Ahmedabad. 2. Introduction to Optical Remote Sensing by P. S. Phisaroty (ISRO-Banglore).

UNIT-II

Transducers

What is Transducers? , Classification of Transducers, Classification based on electrical principle involved, Resistive Position Transducers, Resistive Pressure Transducer, Linear Variable Differential Transducer, Piezoelectric Transducer, Strain gauze Transducer, Temperature Transducers, Resistance temperature Detector, Thermistor, Thermocouple, Various types of Microphones, Carbon microphones, Ribbon microphones, Loudspeaker, Moving coil microphones.

Basic Reference: Book- Basic Electronics (solidstate) by B. L. Tharaja , Pub. S. Chand & Compny (5^{th} Edition)

HOME-

SCIENCE

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NUTRITIONAL BIOCHEMISTRY

Semester – 5th

CC – 11 **FN (501)** **Credit – 2 + 2 = 4**

Objectives :-

This course will enable the students to.

1. Develop an understanding of the principles of biochemist ry (as applicable to human nutrition)
2. Obtain an insight into the chemistry of major nutrients and physiologically important compounds.
3. Understand the biological processes and system as applicable to human nutrition.
4. Apply the knowledge required to human nu trition and dietetics.

UNIT – 1 Introduction to Biochemistry. – Definition, Objectives, Scope and Inter relationship between biochemistry and other biological sciences.

UNIT – 2 (A) Introduction to carbohydrates, Lipids and Proteins.

(B) Enzymes – Definition, Types and Classification of enzymes, definition and types of co – enzymes, specificity of enzymes, Isozymes, Enzyme kinetics including factors affecting velocity of e nzyme catalyzed reactions, enzyme inhibition.

UNIT – 3 Molecular aspect of transport – Passive.

(A) Diffusion, Facilitated diffusion, Active transport.

(B) Intermediately metabolism – general consideration carbohydrates glycolysis, blood sugar regulation.

- Lipids – Oxidation and biosynthesis of fatly acids, Synthesis and utilization of ketone budees, Ketosis, Futly liven.
- Proteins – general reaction of animo and metabolism, urea cycle.

UNIT – 4 (A) Biological oxidation – citric acid cycle, electron transport chain.

(C) Oxidative phosphorylation, energy conservation, high energy phosphate bond.

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Practical :

1. Carbohydrates.
    - Reaction of memo, di, and polysaccharides and their identification in unknown mixtures.
    - Estimation of reducing and total sugar s in foods.
2. Fats.
    - Reaction of fats and oils.
    - Determination of Acid value, Suponitication and Iodine number of natural fats and oil
3. Proteins.
    - Reaction of proteins in foods.
    - Reaction of animo acids and their identification in unknown mixtures.
    - Estimation of total N of foods by KJ eldhal method.

References – Theory.

- West. E.S.Todd, W.R., Mason H.S. and Van Bruggen, J.T. (1974) 4 th Ed. Text book of biochemistry, Amerind Publishing co pvt. Ltd.
- While, A., Handlar P., Smith E.L.Stelten D.W. (1954): 2 nd Ed. Principles of Bio-chemistry, Mc GrawHill Book co.
- Lehniger, A.L. Nelson, D.L. and Cox. M.M. (1993): 2 nd Ed, Principles of Bio-Chemistry BS Publishers and distributors.
- Devlin T.M. (1986) : 2nd Ed. Text book of Biochemistry with Clinical Correlations, John wiley and sons.

References – Practical.

- Oser, B.L. (1965) : 14th Ed. Hawk's Physiological chemistry, Mc Graw Hill Book Co.
- William.S: 16th Ed. JAOAC, official analytical chemicals.
- Indian Standards Institution, (1985) : ISI hand book of food analysis, Parts I to XI, Manak Bhawan, New Delhi.
- Varley, H. Gowenlock, A.H. and Bell.M. (1980) : 5 th Ed. Practical and clinical chemistry. Vol. I William Heinemann medical books ltd.
- Sundararaj, P and Siddhu, A., (1995) : Qualitative tests and quantitative procedures in Bio-chemistry – a practical menual, Wheeler Publishing.

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FOOD COST AND QUALITY CONTROL - I

Semester – 5th

CC – 12 **FN (502)** **Credit – 2 + 2 = 4**

Objectives :-

This course will enable the students to.

- Know the important of cost control and qua lity control.
- Be familiar with costing and pricing of recipes.
- Be familiar with cost reporting system.
- Be aware of the Government regulations and standards of food quality.

UNIT – 1

A. Important of costing and cost control, methods of costing and costing met hodology in catering business, emphasis an batter costing.

B. Cost classification into materials, labour and overheads and their percentage analysis on net sales for clear understanding of their relative importance.

UNIT – 2

A. material costing use of standardi zed receipes material cost control through basic operating activities like purchasing, receiving, storage, issuing production, sales and accounting, yield analysis from time to time.

UNIT – 3

A. Materials costing as an aid to pricing by a suitable mark up po licy.

B. Control of labour costs and overheads, periodicals, percentage analysis calculation of overhead allocation rates.

UNIT – 4

A. Cost behaviour into various, fixed and semivariable and its imact on unit cost.

B. Cost reporting system – daily, monthly and for special managerial decisions.

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Practicals

1. Study different wrapping and packaging materials for different food products.
2. Shelf life studies (to be spread over a few weaks).
3. Food additives – Preservatives, colour, antioxidants, pesticides, flavours.
4. Tests used for wrapping and packaging materials.

References :

- Bhar. B.K. (1977): Cost Accounting, Academic Publishers, Calcutta.
- Matz, A. Curry U and Frank G.W. (1970): Cost Accounting Taraporewala Sons and co. pvt. Ltd., Bombay.
- Prasad N.K. (1979): Principles and Practice of cost accounting, Book syndicate pvt. Ltd., Calcutta.
- Keister D.C. (1977): Food and Beverages control Prentice Hall Inc. New Jersey.
- Kotas R An approach to food costing, Berrie and Rockliff ltd. London.
- Boardmen R.F. : Hotel and Catering Co sting and budgets, Heinemenn, London.
- Paige G. (1979) Catering cost and control cassell, London.

ART PRINCIPLES AND INTERIOR ENRICHMENT

Semester – 5th

CC – 11 **RM (501)** **Credit – 2 + 2 = 4**

Objectives :-

1. Understand elements and principles of art and design.
2. Learn to appreciate art.
3. Develop an understanding to the application of art principles in design composition of traditional and contemporary art, architecture and textiles and interior design.

UNIT – 1 Introduction to foundation of art

- Design, Definition and types :

a) Structure

b) Decorative

- Elements of design.

  Line, Size, Form, Structure, Space, Pattern, Shape.

- Light : Characteristics and classification
- Study of colours – Classification colour schedules etc.

UNIT – 2 Principles of design – definition and their characteristics and types:-

- Balance, Harmony, Scale, Proportion, Rhythm, Emphasis.

UNIT – 3 Indian, regional, traditional and contemporary arts and their use in

- Floor decoration.
- Home decoration.
- Accessories.

UNIT – 4 Flower arrangement types.

- Table setting, importance, types.
- Indianarrangement, Western.
- Importance of lighting in interior decoration.

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Practicals:-

1) Preparation of colour wheel and colour schemes.
2) Application of design principles in flower arrangement – demonstration.
3) Preparing decorative articles.
4) Table setting.
5) Use of element in interior.
   (Colour, furniture arrangement, window treatment etc.)

References:-

- Rutt Anna Hong (1961): Home furnishing, Wiley Eastern Pvt. Ltd.
- Bhat Pranav and Go Enka Shanita (1990): The foundation of art design, Bombay: Lakhani Book Depot.
- Goldstein, H and Goldstein, V. (1967): Art in Everyday Life; New Delhi; Oxferd and IBH Publishing Company.

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CONSUMER EDUCATION

Semester – 5th

CC – 12 **RM (502)** **Credit – 2 + 2 = 4**

Objectives :-

1. To become aware of the consumer problems in the market.
2. To realize the importance of the effective r ole of consumer in the market.
3. To develop good buymanship skill in the selection of goods in the market.

Unit – 1 Consumer and consumer problems.

- Definition of consumers, importance and objectives of consumer education.
- Choice and buying problems of consu mers.
- Faulty weights and measures.
- Adulteration and other malpractices.
- Causes and consequences.

Unit – 2 Role of standards in consumer protections.

- Meaning of standards.
- Product certification.
- Role of certification.
- Good buymanship.

Unit – 3 Consumer rights.

- Consumer responsibilities.
- Factors affecting consumer's decisions in the market.

Unit – 4 Consumer protective services.

- Educational institute.
- Govt. agencies.
- Non govt. agencies, co – operatives.
- Consumer legislations etc.

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Practical :-

1. Market surveyor products-
   - With regards to advertisement, Label, Packaging, Material and Safety and Pricing.
2. Food adulteration.
3. Study about different certification marks.

References:

- Sarkar, A. (1989): Problems of consumers in modern India, Discover Publishing House, Delhi (Unit I, III, V).
- Consumer Report, CERC, Thakurbhai Desai Smarak Bhavan, Ahmedabad (Unit I -V).
- Consumer Conformation, CERC, Thakurbhai Desai Smarak Bhavan, Ahmedabad (Unit I - V).
- Ghosh, A. (1992) The theory of consumer behaviour and welfare in classical paradigm, Bombay: Himalaya Publication House.
- Verma Yogindar, S. and Sharma Chandrakant (eds) (1994); Consumerism in India, Delhi, Anamika Prakashan.

EARLY CHILDHOOD EDUCATION AND CARE

Semester – 5th

CC – 11 **HD (501)** **Credit – 2 + 2 = 4**

Objectives :-

(1) To develop the awareness of the importance of early childhood education.

(2) To develop an understanding of the teaching, learning process.

(3) To help the students to plan programmes for young children.

(4) To develop skill for organizing various activities for children.

Unit – 1 Early childhood education.

- Meaning, specific aims, importance of early childhood education.
- Types of early childhood education.
- Duties and responsibilities in of a nursery school teacher.

Unit – 2 Planning and organizing an ideal early childhood education centre. (Selection of location, building, space).

- Maintenance of various records and registers.
- Curriculum planning – Planning a daily weekly programme.

Unit – 3 Activities in the early education centre.

- Activities to be provided.
- Duration of activities.
- Managing children.
- Science experience and 3'rs learnin g.

Unit – 4 Music in the early childhood education centre.

- Planning music Experiences.
- Singing – Choice of songs, contents, actions.
- Importance of children's literature.

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Evolution of the early childhood education centre.

- Curriculum.
- Parent – Teacher Association.

Practical :

(1) Visit to an ideal crèche and nursery school.

(2) Planning programmes – daily and weekly.

(3) Evaluating the activities.

(4) Preparation of aids to 3'rs development.

(5) Preparation of a weekly, monthly and yearly budget.

References :

(1) બાલવાડી વ્યવસ્થા અને સંચાલન

(2) Mechinges food M. Preschool education today, New approach to teaching 3 -5-5 years olds, Double day & Co. New York.

(3) Read. K, The nursery school, Oxford I.E.H. Publication co. 1969.

(4) Roth Kohn, The exploring child, a handbook for pre primary teac hers, Orient Longman, 1980.

ADOLESCENT AND ADULTHOOD

Semester – 5th

CC – 12 **HD (502)** **Credit – 2 + 2 = 4**

Objectives :-

1. To enable the students to study the changes in adolescence through old age.
2. To make the students aware of the need & problems of adolescence through old age.
3. To study the changing rules from adolescence through old age.

Unit – 1 Adolescence.

- Characteristics of adolescence.
- Developmental tasks.
- Physical changes.
- Social and mental changes.
- The family system at the secondary school age child stage.

Unit – 2 Early adulthood.

- Characteristics of early adulthood.
- Developmental tasks.
- Physical changes.
- Social and mental changes.
- The family system at the young adult stage.

Unit – 3 Middle adulthood.

- Characteristics of early adulthood.
- Developmental tasks.
- Physical changes.
- Social and mental changes.
- The family system during the middle age years.

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Unit – 4 Late adulthood.

- Characteristics of late adulthood.
- Physical changes.
- Social and mental changes.
- The family system at the aging family stage.

Practical:

(1) To study developmental tasks of adolescence.
(2) To study physical and mental changes of adolescence.
(3) To study problems of adolescence.
(4) To study developmental tasks of early adulthood.
(5) To study adjustment problems of early adulthood.
(6) To study developmental tasks of middle adulthood.
(7) To study adjustment problems of middle adulthood.
(8) To study developmental tasks of hate adulthood.
(9) To study physical changes of late adulthood.
(10) To study adjustment problems of late adulthood.
(11) To prepare folder for to giving guideline to adolescence and adulthood.

References:-

- Bigner, Jerry J.; 1994; Individual and family development; Prectice hall; Englewood clifts, New Jersey.
- Eraig, G.T. Human Development, (1976) Prentice Hall Inc. Englewood Clifts, New Jersey.
- Pickunas J., Human Development (1976), 3rd edition, Mc. Graw Hill Kogakusha.

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CLOTHING RELATED TO FASHION TREND

Semester – 5th

CC - 11 **CT (501)** **Credit – 2 + 2 = 4**

Unit – 1 What is fashion?

Factors affect on fashion.

Fashion cycle. (Fashion sherries)

Fashion Terminology.

Unit – 2 Summer wear fashioned garment.

- Colour.
- Texture.
- Design.

Unit – 3 Winter fashioned garments.

- Colour.
- Texture.
- Design.

Unit – 4 Fashion garments for Girl's.

- Colour.
- Texture.
- Design.

Practical:

1) Preparation of traspancies of fashioned garments (5-Transperencies).
2) Fashion illustration of garments of Teenager girl's (5 -Desing by hand) Drawing.
3) Fashion illustration of garments for Adult women (5 Desing by Hand).
4) Fashion Assessorial. (Drawings by hand).

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References Books:

1) Fashion merchandising – By Elaine store.
2) Fashion Design illustration – Women – By Patrick John Ireland.
3) Visual Designs in Dress.
4) Individuality.
5) Magazines (Clothes line, Apparel, Stree (a) etc. Vogue).

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DYEING, PRINTING AND EMBROIDERY

Semester – 5th

CC – 12 **CT (502)** **Credit – 2 + 2 = 4**

Objectives :-

1. To know the student about dyeing of clothes various methods of dyeing types of dye available.
2. To acquire knowledge about hysteric costumes of our country.
3. To acquire knowledge about different types of embroidery of India.

Unit – 1 Introduction of dyes:

- Different types of dyes.
- Classification of dyes.
- Preparation of dyes for particular de ference to cotton silk etc.

Unit – 2 Dyes used for printing.

- Methods of printing.
- Types of printing.
- Equipments required for printing.

Unit – 3 Fundamentals of embroidery.

- Techniques, Design.
- Colour combinations and used of different threads.

Unit – 4 Embroidery stitches types, suitability etc.

- Study of the types of various contemporary embroideries like, shadow work, cut work, smoking appliqué work etc.

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Practicals:

1) Tie and dye work.
- Batik.
2) Fabric painting.
- Block printing.
- Stencil printing.
- Screen making of printing.
- Spray printing.
- Vegetable printing.
3) Malcing samples of traditional embroideries.
- Kashida work, Kantha, Kasuti phulkari, Chamba, Chikankari and gujarat's embroidery etc.

References:

- Creative embroidery Designs, Andorisha Publications .
- Needle craft by Reader's Digest.
- Story Joyce (1974) Manhead of Textile Printing. London, Thames & Human Ltd.

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PRELIMINARY TRAINING PROJECT FORMULATION

Semester – 5th

CC – 11 **Ext (501)** **Credit – 2 + 2 = 4**

Objectives :-

(1) To aware the students about to plan a project for upliftment of rural people .

(2) To know the formulation and application of project in rural area.

(3) To aware the students about role of home science in rural development.

Unit – 1 Training.

- Meaning & Need of training.
- Types of training.
- Phases of training system.

Unit – 2 Project formulation.

- Meaning & importance.
- Objectives & Types.
- Steps involve in project formulation.

Unit – 3 Programme planning.

- Definition & importance.
- Steps involve in programme planning.

Unit – 4

- Essentials for good project.
- Field experience while contracting p eople.

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Practical.

(1) To prepare and organize strategies about child nourishment.

(2) To prepare strategies about immunization programme for children (Traget group 0 – 5 years).

(3) To survey about the problems of child labour.

(4) To prepare and organize strategie s about adult education.

(5) To prepare programme for lactating mother.

References:

- ગૃહવિજ્ઞાન શિક્ષણ – દિપ્તી દેસાઈ

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COMMUNITY ORGANISATION & LEADERSHIP -1

Semester – 5th

CC – 12 **Ext (502)** **Credit – 2 + 2 = 4**

Objectives :-

To enable students to.

1. Appreciate collective action of weaker sections of people for their own development.
2. Understand the community dynamics and its influence on different sections of the community.
3. Study the ideology of organizing people in development.
4. Understand the pattern of leadership in the community traditional and emerging.
5. Understanding the process of organizing people for their own development.

Unit – 1

- Collective action as distinct from individual action.
- Need for collective action:- Improving production and productivity, Improving accessibility to resources, gaining stren gth.

Unit – 2

- Traditional leadership – roles and functions advantages, disadvantages.
- Emerging leadership – Shared leadership.

Unit – 3

- Leadership and community organization for development.
- School dynamics in the village, community / urban slums.

Unit – 4

- Social structure as basis for social dynamics in operation.
- Social justice and equality of opportunities empowering the weaker sections.

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Practicals:

Practicals based on content of theory of community organization and leadership.

Reference:

- Tosslet, D.R. (1976): Facilitating community chang: A Basic Guide, California University Associates.
- Oakley, Peter and Massden Daving (1984); Approaches to participation in Rural Development, hennery tlo.
- Devitt, P. Tension, Planning and the poor, London. ODI.
- Bangkok, FAO (1978); Small Farmers and Development manual, Volumes I & II.
- Geneva, UNICEF / WHO (1977): Community Involvement in Primary Health care: A study of process of community motivation and continued participation.
- Rahman, Md. A. (1981): Some Dimen sions of people's participation in Boomi Seva Movement, UNRISD, Geneva.
- Khot, Seemantince, Shantaken, Ginny Shrivastava, Anita Mathur, Rajesh Tandon and Oriando Lago, How to organize women's Group? New Delhi, UNICEF and PRIA.

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COMMUNITY NUTRITION

Semester – 5th

CA – 7 **CN (503)** **Credit – 2 + 2 = 4**

Objectives :-

This course will enable to students to -

1. Understand the factors that determine the availability and co nsumption of food.
2. Be familiar with the common nutritional problems of the community, their causes, symptoms, treatment and prevention.
3. Get exposed to the schemes, programmes and policies of Government of India to combat malnutrition.
4. Be aware of the health hazards related to food and water.

Theory

Unit – 1 Concept and scope of community nutrition.

Unit – 2 Food availability and factors affecting food availability and its consumption.

- Agricultural production.
- Post harvest handling, marketing and distribut ion.
- Population.
- Economic.
- Regional.
- Socio – cultural and Industrialization.

Unit – 3

(A) Nutritional problems of the community and implication for public health.

(B) Common problems in India.

Causes (nutritional and non – nutritional).

- Incidence of nutritional problems, signs and symptoms and treatment (PEM, Micro nutrient deficiencies – Vitamin A, Iron, Iodine). and fluorosis.

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Unit – 4

(A) Schemes and programmes to combat nutritional problems in India.

(B) Prophylaxis programmes.

- Midday meal programme.
- ICDS.

Practicles:

- To study nutrition policy in India.
- To study mid day neal programme activities in school and nutritional evaluation.
- To visit Anganwadi centre and study the services provided by ICDS.
- To visit Taluka Panchayat and Jilla Panchayat for various program mes (Nutrition child and women welfare).
- To study nutritional problems in different age group in slum areas.
- To plan a menu for PEM, Vitamin A and Iron deficient person.
- To study current prophylaxis programme in your area.

Reference:

- Agrawal, A.N. (1981): Indian Economy Problems of development and planning.
- Jelliffe, D.B. (1968). Child Health in the tropics.
- Shukla P.K. (1982): Nutritional problems of India.
- Thankamma Jacob (1976): Food adulteration.
- Prevention of Food Adultration Act (1994). Government of India.
- Swaminathan M.S.(1962) Fundamentals of Food and Nutrition.

COMMUNICATION METHOD AND MEDIA

Semester – 5th

CA – 8 **CM (504)** **Credit – 2 + 2 = 4**

Objectives :-

To enable students to:

1. Understand the process of communication in development work.
2. Develop skills in the use of methods and media.
3. be sensitive to the interests and needs of the people and the power of the media and methods in catering to these needs and interests.

Unit – 1 Concept of development communication.

- Meaning and importance of commun ication in development.
- The purpose of communication.
- Existing patterns of communication.
- Factors that help or hinder communication.

Unit – 2 Communication process.

- One way and two way or interactive communication.
- Gaps in communication or distortions in transmission of messege and their causes.
- Importance of two way communication.
- Basis for effective, interactive communication critical reflection of one self in communication.

Unit – 3 Methods of communication in development methods to reach individuals.

- Personal conference, Interviews, Home visit Exhibits, Clinics, to solve individual problems of consultations, methods to reach small groups, illustrated lecture, group discussions, role plays demonstration, workshops, camps, methods to reach masses, radio announcements, newspaper stories, posters, video -films, television programmes, letters, folders or pamphlets.

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Unit – 4 Media for development communication.

- Folk media, songs, stories, street theatre, games, arts, puppet play, print media, posters, pamphlets, letters, newspaper – articles, stories, books, cartoons, audios / visuals, audio – visual media, radio broadcasts, audio – tapes, slides, pictures, drawings, photographs etc, videos, films – documentary, feature.

Practicals:

Application of methods and media for communication in development in development programs in rural / urban communities.

a) Problem / need identification of community.
b) Planning an educational programme.
c) Selection, preparation and effective use of methods and media.
d) Evaluation of the effectiveness of methods and media.

References:

1. Duran, J. (1978); Communication for Rural Development, London, U.K. British Counsil.
2. Mody, Bell (1991); Designing Messages for Development Communication, New Delhi, Sage Publications.
3. civiky, M. Team (1979); Contexts of Communication, New York, Holl, Rinehart and Winston.
4. Mc Pherson, A and Timms. H. (1988); The Audio-visual Handbook, London, U.K. Pelham Books.
5. Gramble Teri Kira and Gramble, W. Micheal (1989). Introducing Mass Communication, London, McGraw Hill Book Company.

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PARENTHOOD EDUCATION

Semester – 5th

FE – 5 **PE (507)** **Credit – 2 + 0 = 2**

Objectives :-

1. To understand the importance of parenting and parenthood education.
2. To understand the significance of parents role in children period.
3. To develop skill to involve parents in childhood education.

Unit – 1

- Parenthood, Meaning, Importance, Duties and role.
- Effect of family structure on parenthood.
- Factors affecting to parenthood.

Unit – 2

- The task of parenting and the concept of parenting skills.
- Changing concept of parenthood and children.
- Being a competent parent.

Unit – 3

- Determinants of parenting behaviour.
- Parenthood and planning of family.
- Methods of child rearing practices.

Unit – 4

- Characteristics of the parenting roles. The mothering role, the fathering role.
- Concept of family, the family life cycle stages.
- Effect of culture and family tradition.

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Reference:

1. Diane E. Papalie (1992). Human Development 5th edition International edition M.C. Grow Hill Ime.
2. Harlock Allizabeth "Developmental Psychology".
3. Berk L.E. (1995) Child development London, Allyn & Bacon.
4. Mussen P.H. Conger, J.J.Kagan J. & Huston A.C. (1996) Child development & personality, New York; Harper & Row.

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HUMAN RESOURCE MANAGEMENT

Semester – 5th

ES – 5 **HR (505)** **Credit – 2 + 0 = 2**

Objectives :-

1. To help students enhance their human resource management in the work environment.
2. A student has to develop better chance of capitalizing upon her skills.
3. To help students achieve the goal.

Unit – 1 Introduction to human resource management.

- Need and scope of human resource management in industrial environment.

Unit – 2 Human needs, Relations and Values.

- X and Y theory.
- Importance of human resource in Indian philosophy.
- Maslow's hierarchy, its importance in managing human resource.
- Need of human relations and human values in the industry.
- Self esteem as engineer.

Unit – 3 Behavioral Dynamics.

- Interpersonal Behavior.
- Need for interpersonal competence.
- Leadership.
- Influence of leadership.
- Concept of group dynamics.
- Role of group in organization.
- Do's and Don'ts for developing positive attitude.

Unit – 4 Stress management.

- Concept of stress management.
- Stress measuring techniques.
- Techniques to relative the stress.
- Attributes of stress.

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FUNDAMENTALS OF MARKETING

Semester – 5th

EG – 5 **FM (506)** **Credit – 2 + 0 = 2**

Objectives :-

1. To acquaint students with the difference between selling and marketing.
2. To give an understanding of the marketing concept.
3. To give a through understanding of product planning pricing and practices.

Unit – 1 Nature and role of marketing.

- Meaning, nature and scope of marketing.
- Role and importance of marketing in modern economy.
- The marketing system.

Unit – 2 Product / Pricing.

- Product life cycle.
- Need for product innovations and their development for variety.
- Pricing – economic concept and objective.
- Pricing policies.

Unit – 3 Distribution system.

- Channels of distribution – types and functions.
- Roles and types of advertising.
- Good salesmanship.

Unit – 4 Stages of marketing research process.

- Types of survey.
- Types of market.
- Market segmentation.

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Reference:

- Amarchand, D. and Varadarajan, B. (1981): An introduction to marketing management, Vikas Publishing House Private Ltd.
- Davar, R.S. (1982) Marketing Management, Bombay. Progressive Corporation Private Limited.
- Sherlakar S.A., (1982); Marketing management, Delhi, Himalaya Publishing House.

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ROLE OF HOME SCIENCE IN RURAL DEVELOPMENT

Semester – 5th

EH – 5 **R.R.D (506)** **Credit – 2 + 0 = 2**

Objectives :-

This course will be enable students to.

1. Understand the national effects towa rds rural development.
2. Understand the role of Home Science in rural development.

Unit – 1

A. The role of every subjects of Home Science in rural development. i.e. Food & Nutrition, Resource Management, Human development, Extension education etc.

B. Programmes to enhance food production National food production programmes ever since Indepence – Intensive production schemes.

Unit – 2

A. Poverty alleviation efforts.

Programmes for poverty alleviation for rural areas, employment generation and social inputs.

B. Current programme for rural development.

Unit – 3

A. Programmes for women and children. Women as target group – specific measures for women and children such as DWACRA, ICDS, IMY.

B. Current programmes for women as initiated and implemented by the different ministrie s and developments. Shift from welfare approach to development approach to empowerment approach.

Unit – 4

A. Role of NGOs.

Need for participation of non Governmental organization in developmental efforts. Encouragement given to NUOs.

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B. Preparatory work with local people.

Involve people – Informal contacts and building rapport: Collect basic data general needs and community profile Needs assessment – Identification of Specific needs, obstacles, solutions.

Reference:

- Upadhyaya H.C. (1991): Modernisation and Rural Development, New Delhi, Anmol Publication.
- Desai, Vasanth (1988); Rural Development Programmes and strulegies – volumes I to VI. Bombay, Himalaya Publishing House.
- Kelbugh. Chetna (19991); women and development, New Delhi, Discovery Publishing House.
- Mohsion, Nadeem (1985); Rural Development through government programmes, New Delhi, Mittal Publication.
- Jaurnal of Rural Development. The national institute of Rural Development, Rajendranagar, Hyderabad – 500029.
- Yojana, Director Publication Division, Patiala House, New Delhi – 110012.
- Indian Journal of Extension education. The Indian society of extension education. Division of Agricultural Extension IARI, New Delhi – 110012.

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OFFICE MANAGEMENT

Semester – 5th

FE – 5 **OM (507)** **Credit – 2 + 0 = 2**

Objectives :-

1) To acquire knowledge regarding need for office.
2) To obtain information regarding various function and m anagerial goal and duties of responsibilities of staff.

Unit – 1 Definition of office.

- Latest office appliances.
- Office manuals – definition, characteristics, types.
- Methods of preparing office manuals.
- Merit and demerits of office manuals.

Unit – 2 Company Secretary.

- Types of secretary.
- Definition, qualities of company secretary.
- Status of company secretary and responsibilities.
- Handling of meeting.

Unit – 3 Office Stationary.

- Introduction.
- Types of office stationary.
    - Purchasing of office stationary
    - Methods.
- Control of office stationary consumption.
- Office registers and account keeping.

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Unit – 4 Office behaviour.

- Importance of human behaviour in office.
- Behaviour with out siders.
- Behaviour of superiors.
- Behaviour with colleagues.
- Behaviour subordinates.
- Meral support of office staff.
- Motivation and incentives of office staff.
- Filing and indexing.

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B.A/ B.Sc / Fine Arts / Home Science/B.Com PROGRAMME

Semester -V

Foundation Compulsory

(Com. English)

Unit 1

Text

Lesson. 1, 5, 6

The Joy of Reading – Selected Prose & Poetry

(Orient Longman)

Poems 11, 12, 13

Unit 2

Grammar

- Indirect Narration
- Conjunction
- Use of Phrasal Preposition and Verbs

1. Inspite of	2. Instead of	3. Owing to	4. Due to
5. Because of	6. With a view to	7. On account of	8. According to
9. In order to	10. Account for	11. Abide by	12. Look for
13. wind up	14. Come across	15. Break into	16. Give in
17. Keep up	18. Look forward to	19. Put off	20. Set out
21. Run into	22. Look after	23. Bring up	24. Get off
25. cut down	26. Fall through	27. Work out	28. Shut down
29. hand over	30. Pull down		

Unit 3

Translation (From English to Gujarati/ Hindi)

Unit 4

Dialogue Writing

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SCHEME OF EXAMINATION

SEMESTER – V

(FOUNDATION COMPULSORY ENGLISH)

ARTS/ SCIENCE/ FINE ARTS/ HOME SCIENCE/B.Com

		Marks
Q- I	One very long question from prose section with an internal option from poetry section of unit - I	(15)
Q- II	Short questions Five out of Eight from unit–I	(20)
Q- III	Translation from English to Gujarati/ Hindi	(10)
Q-4	Grammar	(18)
	(A) Indirect Narration (Six Out of Seven)	
	(B) Conjunction (Fill in the blanks with multiple choice- Six Out of Seven)	
	(C) Use of Phrasal prepositions & Verbs in meaningful sentences - Six Out of Seven	
Q- V	Dialogue writing on a given topic (One out of Two)	(7)

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ELECTIVE

GENERIC

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B. Sc. (Sem-I to VI) Programme

Under CBCS-Semester-Grading pattern
List of Elective (Generic) Courses (W.E.F : June 2012)

Each Course of 2 credits and Number of Contact hours = 2 Per Week

(Approximately 24 Contact Hours in Each Semester)

N.B : There are possibilities of Modification in these Course

SEMESTER I

EG-111	Communication Skills
EG-112	Basics of Mathematics
EG-113	Basics of Biology

SEMESTER II

EG-121	Environmental Science
EG-122	Disaster Management

SEMESTER III

EG-211	Personality Development
EG-212	Value Oriented Education

SEMESTER IV

EG-221	Entrepreneurship Development and Small Scale Business Management
EG-222	Human Rights

SEMESTER V

EG-311	Database Management System
EG-312	Indian Constitution

SEMESTER VI

EG-321	Information Technology
EG-322	Naturopathy

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Examination Scheme for Elective (Generic) Course

For Generic Courses Other than Computer Courses

Time: **2 Hours** **Theory Examination** Total Marks: **50**

1.	MCQs (10 out of 12) (Each of **1** Mark) [At least **6** questions from each Unit]	**10**
2 (A)	Short notes (2 out of 3) (Each of **4** Mark) [only from Unit-I]	**08**
2. (B)	Long Question (2 out of 4) (Each of **3** Mark) [only from Unit-I]	**06**
2. (C)	Short Question (6 out of 9) (Each of **1** Mark) [only from Unit-I]	**06**
3 (A)	Short notes (2 out of 3) (Each of **4** Mark) [only from Unit-II]	**08**
3. (B)	Long Question (2 out of 4) (Each of **3** Mark) [only from Unit-I]	**06**
3. (C)	Short Question (6 out of 9) (Each of **1** Mark) [only from Unit-I]	**06**

Examination Scheme for Elective (Generic) Course

For Computer Courses : EG-311,EG-321

Time: **1.5 Hours** **Theory Examination** Total Marks: **30**

1.	MCQs (6 out of 9) (Each of **1** Mark) [At least **4** questions from each Unit]	**06**
2 (A)	Short notes (2 out of 3) (Each of **4** Mark) [only from Unit-I]	**08**
2. (B)	Short notes (4 out of 6) (Each of **1** Mark) [only from Unit-I]	**04**
3 (A)	Short notes (2 out of 3) (Each of **4** Mark) [only from Unit-II]	**08**
3. (B)	Short notes (4 out of 6) (Each of **1** Mark) [only from Unit-II]	**04**

Practical Examination

Examination Pattern for EG-311,EG-321: (Computer Courses)

Time: **1 Hour**] [Maximum Marks: **20**

1.	પ્રેક્ટિકલ (2 પ્રેક્ટિકલ સ્વાધ્યાયમાંથી કોઈ પણ 1) Practical (1 out of 2 practical exercise)	**15**
2. a.	મૌખિક પ્રશ્નોત્તરી. [*viva-voce.*]	**03**
b.	પ્રયોગપોથી [Journal.]	**02**

Note: * Student will have to note all the steps/procedure related to the practical carried out by him/her in his/her answer book. Due weightage should be given while evaluating the practical. The purpose of this requirement is to create the skill of documentation among the students.

* These answer book will be submitted with the along with the mark sheet to the university by the examiner.

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SEMESTER V

EG-311 Database Management System
EG-312 Indian Constitution

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Programme code :		**B.Sc.**	**Programme Name :**	**Database Management System**
Course Code		EG 311	**Semester :**	V
Personality Development				
Course type :		Elective Generic	**Total credit :**	02
Teaching time (hours)		**Examination Marking scheme**		
Theory (hrs)	**Practical** (hrs)	**Internal** (Marks)	**External** (Marks)	**Total** (Marks)
2	-	20	30	50

Database Management System

Unit I

1. Properties of a Database
2. Prevalent Database Models
3. Conceptual Database Design Components
4. Logical/Physical Database Design Components

Unit II

1. Getting Started in Microsoft Access
2. The Microsoft Access Relationships Panel
3. The Microsoft Access Table Design View
4. Creating Queries in Microsoft Access

Reference Book

Database demystified : A self-teaching guide, Andrew J. (Andy) Oppel, McGraw-Hill Publication

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HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN				
Programme code :	**B.Sc.**	**Programme Name :**	**Indian Constitution**	
Course Code	EG 312	**Semester :**	V	
Personality Development				
Course type :	Elective Generic	**Total credit :**	02	
Teaching time (hours)		**Examination Marking scheme**		
Theory (hrs)	**Practical** (hrs)	**Internal** (Marks)	**External** (Marks)	**Total** (Marks)
2	-	-	50	50

Indian Constitution

Unit I

Preamble: Preamble of the constitution [1*] and its importance [2]. Important words used in Preamble: Sovereign [3], Socialist [3], Secularism [4], Democratic [4], Republic [5], Fraternity [5], Equality [5], Liberty [5]. Federal system and its main characters [8]. The Constitution of India whether Federal? [9].
The Union and its Territory: The Union and its Territory [13], Admission of new states [14], Formation of new states and alteration of areas, boundaries or names of existing states [14].
Fundamental Rights and Duties: Fundamental Rights: Only Six-types (only names) [26], Fundamental Rights and Human Rights [26]. Fundamental Duties [93].

Unit II

The Union: Qualifications for The President of India [96], Executive power of the Union [96], Constitutional position of The President [97] , Election of President [98], Powers of the President [99-103]. The Vice President of India [104], Election of Vice President [104 - 05], Council of Ministers: Council of Ministers to aid and advise President [106], Other provisions as to Ministers [106-109].
Parliament: Constitution of Parliament [116], Composition of t he Council of States [116],Composition of the House of the People [117], Duration of Houses of Parliament [118], Qualification for membership of Parliament [119].The Chairman and Deputy Chairman of the Council of States [121], The Speaker and Deputy Speake r of the House of the People [122], Joint sitting of Both Houses in Certain Cases [134 -136].
The Union Judiciary: Establishment and Constitution of Supreme Court [148-151], Original Jurisdiction of Supreme Court [153], Advisory Jurisdiction of Supreme Co urt [164], Comptroller and Auditor General of India [168].

Major reading:

(* Page Number from) **Karia A N** (2010-11) **Bharatiya Bandharan**, C. Jamnadas's Co., C-18, Madhupura
Market, Near Office of the Police Commissioner, Shahibaug Rd., Ahmedabad -380 004 (Phone: 30289001)

Other readings:
NCERT Book For Class XI : Indian Constitution at Work Political Science .
http://www.upscportal.com/civilservices/ncert -books/class-xi-indian-constitutionat-work-political-science

ENGLISH

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HEMACHANDRACHARYA NORTH GUJARAT UNIVERSITY
PATAN-384 265

NAAC Accreditation Grade –"B"

English Compulsory

New Syllabus (CBCS)
(For Semester : I to IV)

ARTS / SCIENCE / FINE ARTS

W.E.F. JUNE-2011

Date:20/6/2011

Total Page:05

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SCHEME OF EXAMINATION

SEMESTER – V

(FOUNDATION COMPULSORY ENGLISH)

ARTS/ SCIENCE/ FINE ARTS/ HOME SCIENCE/B.Com

		Marks
Q- I	One very long question from prose section with an internal option from poetry section of unit - I	(15)
Q- II	Short questions Five out of Eight from unit–I	(20)
Q- III	Translation from English to Gujarati/ Hindi	(10)
Q-4	Grammar	(18)
	(A) Indirect Narration (Six Out of Seven)	
	(B) Conjunction (Fill in the blanks with multiple choice- Six Out of Seven)	
	(C) Use of Phrasal prepositions & Verbs in meaningful sentences - Six Out of Seven	
Q- V	Dialogue writing on a given topic (One out of Two)	(7)

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GEOLOGY

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HEMCHANDRACHARYA NORTH

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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 VProgramme)

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

N. Gujarat,INDIA.

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 501 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 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 nicol s.

3. Viva-voce.

4. Journal Work.

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GEOLOGY

PRACTICAL

(Effective from June-2018)
GEO 502 PR-2

Common Formula for Question Paper (Practical Course)

Time: 05 Hours

Total Marks: 50

Practical Examination Pattern:

1. Identify the given Crystal model and Write the Axial ratio, System, Symmetry, Class, Type, Combination forms and Mineral name.
2. Identify the crystal Model and draw a crystal projection.
3. Viva-voce.
4. Journal Work.

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GEOLOGY

PRACTICAL

(Effective from June-2018)

GEO 503 PR-3

Common Formula for Question Paper (Practical Course)

Time: 05 Hours

Total Marks: 50

Practical Examination Pattern:

1. Draw a map section of given map. Write the Description of it.
2. Viva-voce.
3. Journal Work.

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GEOLOGY

PRACTICAL

(Effective from June-2018)

GEO 504 PR-4

Common Formula for Question Paper (Practical Course)

Time: 05 Hours

Total Marks: 50

Practical Examination Pattern:

1. Solve the given Geometrical exercise.
2. Solve the Outcrop filling problem and write the order of superposition and give comment on the map.
3. Viva-voce.
4. Journal Work.

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UNIVERSITY, PATAN-384265

NAAC Accreditation Grade–"A"

FACULTY OF SCIENCE
GEOLOGY Syllabus
(Effective from June-2018)

The pattern of university exam:

Written	Examinationt ime	Marks External	Marks Internal
Core Course	3 hours (per course)	70	30
Practical Core Course	7 hours (two days)	200	--
Subject elective course	2 hours	50	--

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HEMCHANDRACHARYA NORTH GUJARAT

UNIVERSITY, PATAN-384265

Design and Structure of Geology (EarthSciences) U G semester V Coursesfor Credit Based Semester System to be implemented from June 2018

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN						
B. Sc. Three year (General) Programme with 144 credits Semester -V and VI 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 - V						
	Core Compulsory (CC) Course					
GEO 501	Mineralogy; Crystallography.	3	30	70	100	3
GEO 502	Petrology– Igneous and Metamorphic.	3	30	70	100	3
GEO 503	Structural Geology; Sedimentary Petrology.	3	30	70	100	3
GEO 504	General &Standard Stratigraphy; Geology of Peninsular India.	3	30	70	100	3
	Practical core (PC) Course					
GEO 501 PR-1	Megascopic and Microscopic Minerals	3		50	50	1.5
GEO 502PR-2	Crystallography; crystal projections.	3		50	50	1.5
GEO 503PR-3	Structural–Maps (with Unconformity, Overlap and Fault)	3		50	50	1.5
GEO 504 PR-4	Simple Geometrical exercise, simple Out Crop Filling Problems.	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 505(CSE)	Elective (Geology) Course - Fundamentals of Hydrogeology	2		50	50	2
		30	**150**	**650**	**800**	**24**

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B. Sc.

SemesterV

GEOLOGY -THEORYandPRACTICALS

Course Outline

Course	Details
GEO 501	Mineralogy; Crystallography.
GEO 502	Petrology – Igneous and Metamorphic.
GEO 503	Structural Geology; Sedimentary Petrology.
GEO 504	General and Standard Stratigraphy; Geology of Peninsular India.
GEO 505 (CSE)(CoreSubjectElective)	Fundamentals of Hydrogeology
GEO 501 PR-1	Megascopic and Microscopic identification of Minerals;
GEO 502 PR-2	Crystallography, Crystal Projections.
GEO 503 PR–3	Structural – Maps (with Unconformity, Overlap and Fault)
GEO 504 PR-4	Simple Geometrical exercise, Simple Out Crop Filling Problems.

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B.Sc.

Semester V

GEOLOGY - THEORY and PRACTICALS

Course-wise detail syllabus

GEO 501: Mineralogy; Crystallography:

Unit	Coursedetails	Credits
Unit–1	**Mineralogy** Structure of silicate minerals, Study of Rock forming minerals, chemical classification of minerals and study of chief mineral families – Silica, Feldspar, Feldspathoid, Mica, Amphibole, Pyroxene, Olivine, Garnet, Zeolite, Alumino -silicate, Epidote, Zoisite.	**1**
Unit–2	**Optical Mineralogy** Detail study of optical properties -Extinction, Interference colours, Order of interference colours– their controlling factors. Uniaxial and Biaxial interference figures and optic sign determination – microscopic accessories.	**1**
Unit–3	**Crystallography** Crystallography – Hexagonal (Tourmaline and Quartz types), Monoclinic and Triclinic crystal systems – their detailed study. Twinning in crystals.	**1**

REFERENCE BOOKS:

Read, H.H. (1960): Rutley's Elements of Mineralogy (26th Edition). CBS Publishers and Distributers.

Kerr, P.F. (1977): Optical Mineralogy. Mc Graw Hills Inc

Winchel, N.H.; Winchel, A.N. (1968): Elements of Optical Mineralogy. Willey Eastern Ltd. Delhi.

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GEO 502: Petrology: Igneous and Metamorphic:

Unit	Course details	Credits
Unit–1	**Igneous Petrology** Magma - Types, origin and composition. Pyrogenetic minerals – Ortho-, meta- and polysilicates. Saturated – Undersaturated minerals. Crystallisation of Unicomponent and bicomponent magma with influencing factors and appropriate examples. Bowen reaction series.	**1**
Unit–2	**Igneous Petrology (Conti.)** Textures of igneous rocks. Classification – mineralogical, chemical, textural and Hatchscheme. Basic principles of thermodynamics. Phase equilibrium in two and three component silicate system.	**1**
Unit–3	**Metamorphic Petrology** Types of metamorphism –Thermal, Dynamothermal, Cataclastic and Plutonic.	**1**
	Metamorphic structures and Textures. Classification of metamorphic rocks. Outlines of zones, facies and phase diagrams of metamorphism. Facies series and isograde. Relationship between metamorphism and deformation. Equilibrium and non-equilibrium reactions in metamorphic processes. Composition - paragenetic diagrams. Projective analysis.	

REFERENCEBOOKS:

Bose, M.K.(1997): Igneous Petrology. World Press.

Tyrell, G.W. (1960): The Principles of Petrology. Asia Publishing House.

Bhaskar Rao, B.C. (1986): Metamorphic Petrology. Oxford and IBH Publishers, New Delhi.

Moorhouse, W.W. (1964): The Study of Rocks in Thin Sections. Harper and Row.

GEO 503: Structural Geology; Sedimentary Petrology:

Unit	Course details	Credits
Unit–1	**Structural Geology** Causes, Mechanism, Classification and types of Faults and Joints. Causes, Mechanism, Classification and types of Folds. Structural concepts of main mountain ranges – Himalaya and Aravalli. Order of super position in the field.	**1**
Unit-2	**Sedimentary Petrology** Genesis, classification and Types of sedimentary deposits – Residual, Detrital, Chemical and organic. Sedimentary structures.	**1**
Unit-3	**Sedimentary Petrology (Conti.)** Diagenesis of terrigenous and chemical sediments. Dynamics of aeolian, fluvial, near - shore and deep-sea environments. Concept of sedimentary facies. Basic principles of palaeoenvironment and palaeoclimate analysis.	**1**

REFERENCE BOOKS:

Billings, M.P. (1977): Structural Geology. Prentice Hall.

Hobbs, B.E.; Means, W.E. and Williams, P.F. (1957): An Outline of Structural Geology.

Tyrell, G.W. (1960): The Principles of Petrology. Asia Publishing House.

Blatt, H. (1982): Sedimentary Petrology. Freeman &Company.

Nichols, G. (1999): Sedimentology and Stratigraphy. Blackwell.

Reading, H.G. (1996): Sedimentary Environments. Blackwell.

Pettijohn, F.J.; Potter, P.E. and Siever, R. (1990): Sand and Sandstone. Springer Verlag.

Sengupta, S. (1997): Introduction to Sedimentology. Oxford &IBH Publishing Company.

Bhattacharya, A. &Chakraborti, C. (2000): Analysis of Sedimentary Successions. Oxford & IBH Publishers. New Delhi.

Moorhouse, W.W. (1964): The Study of Rocks in Thin Sections. Harper and Row.

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GEO 504: General and Standard Stratigraphy; Indian Stratigraphy (Peninsular):

Unit	Course details	Credits
Unit–1	**General Stratigraphy** Facies concept in stratigraphy, Indexfossils, Concept of Palaeogeography, Igneous phenomena, Tectonic phenomena, Rock Suites and petrographic provinces. Geological Time, Geological eras and their sub-divisions.	**1**
Unit–2	**Standard Stratigraphy** Stratigraphical eras and their sub-divisions – Outlines of Standard Stratigraphy and their general study. (Emphasis to be given on Palaeogeography and life forms of the time). Correlation of the major Indian formations with their world equivalents.	**1**
Unit-3	**Indian Stratigraphy (Peninsular)** Detail study of fundamental complex - Archaean - Dharwar, Cuddapahand Vindyan Super Groups. Detail study of Post Archaean formations of Peninsular India-Gondwana Super Group, Mesozoic, Deccan Trap and Tertiary of Peninsula.	**1**

REFERENCE BOOKS:

Wadia, D.N. (1962): Geology of India. Tata McGraw Hill.

Krishnan, M.S. (1968):Geology of India and Burma. HigginBothams.

Ravindra Kumar (1982): Fundamentals of Historical Geology and Stratigraphy of India. Willey Eastern Ltd.

Naqvi, S.M. and Rogers, J.J.W. (1987): Precambrian Geology of India. Oxford University Press.

Pascoe, E.H. (1968): A Manual of Geology of India and Burma. Vol.I-IV. Govt.of India Press.

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GEO 505 (CSE): Fundamentals of Hydrogeology :

Unit	Coursedetails	Credits
Unit–1	**Hydrogeology** Hydrologicalpropertiesofrocks - porosity,permeability,specificyield.Subsurfaceclassificationofgroundwater. Classificationofaquifers.Darcy'slawanditsvalidity.	**1**
Unit–2	**Hydrogeology (Conti.)** Conceptofwatershedmanagement. ElementaryknowledgeofuseofAerialphotographsandremotesensingtechniques inhydrogeology.	**1**

REFERENCE BOOKS:

Karanth, K.R. (1989): Hydrogeology. Tata McGraw Hill.

Karanth, K.R. (1987): Groundwater Assessment – Development and Management. Tata McGraw Hill.

Davis, Stanley N. and Dewiest Roger, J.M. (1966): Hydrogeology. John Willey &Sons, Inc.

Raghunath, H.M. (1987): Ground Water. Willey Eastern Ltd.

Subramaniam, V. (2000): Water Kingston Publishers. London.

Mahajan, Gautam (1989): Evaluation and Ground water. Ashish Publishing House.

Todd, D.K. (1980): Groundwater Hydrology. John Wiley.

Tallman, C.E. (1937): Ground Water. McGraw Hill.

Schultz, J.R. and Cleaves, A.B. (1955): Geology in Engineering. John Willey.

Singh, P. (1985): Principles of Engineering Geology.

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GEO 501 PR – 1: Megascopic and Microscopic Identification of Minerals;

Course details	Credits
Mineralogy **Megascopic study of metallic and non-metallic minerals representing important mineral families:** Leucite, Nepheline, Sodalite, Scapolite, Enstatite, Hypersthene, Bronzite, Wollastonite, Tremolite, Actinolite, Glaucophane, Serpentine, Andalusite, Sillimanite, Kyanite, Topaz, Staurolite, Sphene, Epidote, Analcime, Stilbite, Apophyllite, Kaolin, Aragonite. **ORES:** Stibnite, Rutile, Psilomelane, Cassiterite, Corundum, Franklinite, Willemite, wolframite, Azurite. **Study of the following minerals in thin sections:** Chlorite, Staurolite, Kyanite, Sillimanite, Andalusite, Enstatite, Bronzite, Tremolite, Diopside, Nepheline, Leucite, Hauyne, Nosean.	**2**

GEO 502 PR – 2: Crystallography; Crystal Projections Lab.:

Crystallography Study of crystal models representing Four types (Tourmaline and Quartz of Hexagonal system, Gypsum of Monolinic and Axiniteof Triclinic system) with diagrams. Study of twin crystals with diagrams. **Crystal Projection:** Clinographic projections of simple crys tals of Cubic, Tetragonal and Orthorhombic systems. Representation of elements of symmetry of four types of symmetry with stereographic projections.	**2**

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GEO 503 PR–3: Structural Geology Lab.:

Course details	Credits
Section and description of geological maps with structural features such as unconformity, overlap, faulting, inliers, outliers and igneous intrusions.	**2**

GEO 504 PR–4: Structural Geology Lab.:

Course details	Credits
Outcrop problems with one series of strata with inlier, outlier. Graphic solutions of structural problems. Viva Voce.	**2**

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