HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY

NAAC A (3.02) State University

PATAN- 384265

Faculty of Science

B. Sc. Biotechnology

Syllabus/ scheme

Sem. – 1

PROGRAM CODE : HNGU1064

Sem./CBCS/Grading pattern

w. e. f. June-2020

B.Sc. Syllabus for Semester I
SUBJECT: Biotechnology
wef 2020-21

B.Sc. (Biotechnology) Semester-1
➢ **CC- BT-101 Introduction to Biotechnology & Cell Biology**
Elective Course
EC-1 Entrepreneurship Development
EC-2 Biotechnology and Human Welfare
EC-3 Plant Biodiversity

B.Sc. (Biotechnology) Semester-1

CC- BT-101 Introduction to Biotechnology & Cell Biology

LEARNING OUTCOMES:

- Students will understand the structures and purposes of basic components of prokaryotic and eukaryotic cells, especially macromolecules, membranes, and organelles
- Students will understand how these cellular components are used to generate and utilize energy in cells
- Students will understand the cellular components underlying mitotic cell division.
- Students will apply their knowledge of cell biology to selected examples of changes or losses in cell function. These can include responses to environmental or physiological changes, or alterations of cell function brought about by mutation.

UNIT I   (10 Periods)

Introduction to biotechnology, definitions, applied area of biotechnology. history of biotechnology. sectors of biotechnology in agriculture, health and environment. Scopes of biotechnology. Biotechnology in India (Scopes and organizations)

UNIT II   (10 Periods)

Cell: Introduction and classification of organisms by cell structure, cytosol, compartmentalization of eukaryotic cells, cell fractionation. Cell Membrane and Permeability: Chemical components of biological membranes, organization and Fluid Mosaic Model, membrane as a dynamic entity, cell recognition and membrane transport.

UNIT III   (15 Periods)

Membrane Vacuolar system, cytoskeleton and cell motility: Structure and function of microtubules, Microfilaments, Intermediate filaments. Endoplasmic reticulum: Structure, function including role in protein segregation. Golgi complex: Structure, biogenesis and functions including role in protein secretion.

UNIT IV   (20 Periods)

Lysosomes: Vacuoles and micro bodies: Structure and functions Ribosomes: Structures and function including role in protein synthesis. Mitochondria: Structure and function, Genomes, biogenesis. Chloroplasts: Structure and function, genomes, biogenesis Nucleus: Structure and function, chromosomes and their structure.

SUGGESTED READING

Karp, G. 2010. Cell and Molecular Biology: Concepts and Experiments. 6th Edition. John Wiley & Sons. Inc.

De Robertis, E.D.P. and De Robertis, E.M.F. 2006. Cell and Molecular Biology. 8th edition. Lippincott Williams and Wilkins, Philadelphia.

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Cooper, G.M. and Hausman, R.E. 2009. The Cell: A Molecular Approach. 5th edition. ASM Press & Sunderland, Washington, D.C.; Sinauer Associates, MA.

Becker, W.M., Kleinsmith, L.J., Hardin. J. and Bertoni, G. P. 2009. The World of the Cell. 7th edition. Pearson Benjamin Cummings Publishing, San Francisco.

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PCC-1- PRACTICALS
CC- BT-101 Introduction to Biotechnology & Cell Biology

1. Basic layout of Biotechnology lab

2. Introduction to laboratory instruments

3. Microscopy- Simple & Compound- Basic components & Principle

4. Define various staining- stain types and Principles

a. Simple staining & Negative

b. Gram staining, Capsule staining, Nuclear Mitochondrial staining

5. Study of structure of any Prokaryotic and Eukaryotic cell.

6. Cell division in onion root tip

7. Study, observation and identification of various permanent slides

Elective (Generic) Course 1 Entrepreneurship Development

LEARNING OUTCOMES:

- ➢ Have the ability to discern distinct entrepreneurial traits
- ➢ Know the parameters to assess opportunities and constraints for new business ideas
- ➢ Understand the systematic process to select and screen a business idea
- ➢ design strategies for successful implementation of ideas
- ➢ write a business plan

UNIT I **(10 Periods)**

Meaning, Needs and Importance of Entrepreneurship, Promotion of entrepreneurship, Factors influencing entrepreneurship, Features of a successful Entrepreneurship.

Forms of Business Organization, Project Identification, Selection of the product, Project formulation, Assessment of project feasibility.

Importance of finance / loans and repayments, Characteristics of Business finance, Fixed capital management: Sources of fixed capital, working capital its sources and how to move for loans, Inventory direct and indirect raw materials and its management.

UNIT II **(13 Periods)**

Meaning and Importance, Marketing-mix, product management – Product line, Product mix, stages of product like cycle, marketing Research and Importance of survey, Physical Distribution and Stock Management.

Meaning of International business, Selection of a product, Selection of a market for international business, Export financing, Institutional support for exports.

Project Report on a selected product should be prepared and submitted.

SUGGESTED READING

Entrepreneurship: New Venture Creation : David H. Holt

Patterns of Entrepreneurship : Jack M. Kaplan

Entrepreneurship and Small Business Management: C.B. Gupta, S.S. Khanka, Sultan Chand & Sons.

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Elective (Subject) Course 2 Biotechnology and Human Welfare

LEARNING OUTCOMES:

This course is designed to give an idea about the role of biotechnology in relation to Human welfare.

UNIT I (10 Periods)

Industry: protein engineering; enzyme and polysaccharide synthesis, activity and secretion, alcohol and antibiotic formation.

Agriculture: N_2 fixation: transfer of pest resistance genes to plants; interaction between plants and microbes; qualitative improvement of livestock.

UNIT II (15 Periods)

Environments: e.g. chlorinated and non-chlorinated organic pollutant degradation; degradation of hydrocarbons and agricultural wastes, stress management, development of biodegradable polymers such as PHB.

Forensic science: e.g. solving violent crimes such as murder and rape; solving claims of paternity and theft etc. using various methods of DNA finger printing.

Health: e.g. development of non-toxic therapeutic agents, recombinant live vaccines, gene therapy, diagnostics, monoclonal in *E. coli*, human genome project.

Elective (Subject) Course 3 Plant Biodiversity

LEARNING OUTCOMES:

This course is designed to give knowledge regarding immense plant biodiversity exist in biological world.

UNIT I

Overview of two kingdom classifications. five kingdom classification. General characters of pteridophytes, affinities with bryophytes & gymnosperms, classification, economic importance.

UNIT II

General characters, classification of gymnosperms and angiosperms, economic importance of seed plants

SUGGESTED READING

1. Bhatnager, S.P. and Moitra, A. 1996 Gymnosperms. New Age International (P) Ltd. Publishers, New Delhi.

2. Parihar, N.S. 1996. The Biology and Morphology of Pteridophytes. Central Book Depot, Allahabad.

3. Sambamurty 2008 A Textbook of Bryophytes, Pteridophytes, Gymnosperms and Paleobotany. IK International Publishers.

4. Wickens, G.E. 2004 Economic Botany: Principles and Practices, Springer. Kuwer Publishers, Dordrecht, The Netherlands

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY

NAAC A (3.02) State University

PATAN- 384265

Faculty of Science

B. Sc. Chemistry

Syllabus/ scheme

Sem. – 1

Sem./CBCS/Grading pattern

w. e. f. June-2020

B.Sc. Semester - I
CHEMISTRY SYLLABUS
(Effective From June - 2020)
B.Sc. (Six Semester Programme)

The proposed new courses in chemistry for under graduate classes are reassigned in accordance to semester/CBCS/Grading system with new educational policy. The new course in based on model curriculum of the university grants commission.

The medium of instruction should be Gujarati and/or English and the question paper should be drawn in Gujarati with the English version. Students are permitted to write answers 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 with special emphasis on local requirements, environment and to link the courses, with requirements of the industries and research. . .

This syllabus is to be completed by assigning four periods of one hour each and two practical's of two hours each per week.

The number of students in practical batch should not exceed Twenty.

PATTERN OF EXAMINATION

There will be one paper for core compulsory and one paper for subject elective theory and Five Hours for practical in the University Examination. The pattern will be as follow.

Written	Examination Time	Marks - External	Marks-Internal
Core Course	2.30 hours	70	30
Sub. Elective Course	2.00 hours	35	15
Fundamental Course	2.00 hours	35	15
Practical Core Course	5 hours	50	- -

UNIT: 1 :(A) : CHEMICAL BONDING

- Valence bond theory & its application, Ex. H_2
- Directional characteristics of covalent bond
- Various types of hybridization and shape of simple inorganic molecules Ex. $sp - BeCl_2$, $sp^2 - BF_3$, $sp^3 - CH_4$, $dsp^3 - PCl_5$, $d^2sp^3 - SF_6$
- V.S.E.P.R. theory for NH_3, H_2O
- M.O. Theory-Energy level diagram for homo nucleus diatomic molecules (N_2 and O_2) and hetero diatomic molecule (CO and NO)

(B) :F – BLOCKELEMENTS
- Lanthanide electronic configuration, Oxidation state
- Lanthanide contraction, Effect of lanthanide contraction
- Separation method
  (1) Solvent extraction methods
  (2) Ion Exchange Method

UNIT: 2 :(A) : STRUCTURE AND PROPERTIES
Factors affecting to the properties of organic molecule
- Intramolecular forces (dipol-dipol interaction, vanderwaals forces)
- Electromeric effect
- Inductive effect
- Resonance effect(draw resonating structures of Nitro benzene, Chlorobenzen, Phenoxide ion, Anillinium ion, Acetate ion)
- Hyper conjugation (o,p-directing effect of Alkyl group, Stability of Carbonium ion and Free radicals)

(B) :REACTION MECHANISM

- Fission of Co-Valent bond (With at least one example of eachintermediates)
- Types of reagents.
- Types of organic reaction with mechanism.
- Substitution reactions (Nucleophillic&Electrophillic)
- Addition reactions (Nucleophillic&Electrophillic)
- Elimination reactions (E_1& E_2)

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UNIT :3 : THERMODYNAMICS

- Thermodynamics (only introduction)
- System and surrounding- work & heat, state function, thermodynamic process, internal energy, enthalpy, free energy, maximum work function.
- First law of thermodynamics
  heat capacity, specific and molar heat capacity, heat capacity at constant volume and pressure and their relationship
- Work done in adiabatic and isothermal reversible expansion of an ideal gas.
- Second law of thermodynamics
- Carnot cycle and its efficiency
- Concept of entropy ; entropy change for an ideal gas under different conditions, entropy change for mixture of ideal gases
- Gibbs-Helmholtz equation
- Numerical

UNIT : 4 : INTRODUCTION TO VOLUMETRIC ANALYSIS

- **Principle, Mechanism and Applications of,**
- Acid-Base Titrations (Only strong acid Vs strong Base).
- Redox Titrations (Only Fe(II) Vs $KMnO_4$)
- Complexo metric Titrations (Only Ca^{+2}/Mg^{+2} Vs EDTA)
- Precipitation Titrations (Only Cl^- Vs $AgNO_3$).
- Related Numericals.

: REFERENCE BOOKS :

INORGANIC CHEMISTRY

1. 'Source Book on Atomic Energy' by glastone, 1969.

2. 'Modern Inorganic Chemistry' by G.F.Liporni, ELBS, 4th edn. coilingEducational. 1983.

3. 'Inorganic Chemistry' D.F.Shriver. P.W.Atkinss and C.H.Longford, 3rdedn, ELPS Oxford University Press, 1999.

4. 'Nuclear and RedioCnemistrv' by G fried lander, J.W.Kcnned. E.S.macias andJ.M.MiIIer, 3rdedn, John wiley, 1981.

5. Essentials of Nuclear Chemistry' H.J.Arnical, 4thedn, New Age International. 1995.

6. 'Concise Inorganic Chemistry' J.D.Lee. 5thedn.

7. 'Inorganic Chemistry', D.F.Slirjver, P.W.Atkinss, 3rdedn, Oxferd. 1999.

8. 'Concise Inorganic Chemistry' J.D.Lee, 4thedn, Champman and hall ELBS, 1991.

9. 'Inorganic Chemistry' by A.G.Sharp, 3rdedn, ELBS, Longman, 1990.

ORGANIC CHEMISTRY

1. 'Organic reaction and mechanism, P.S.Kalsi, New Age internationalPublishers.

2. Text book of organic Chemistry. P.S.Kalsi, New Age international Publishers.

3. Organic Chemistry Vol. I&II.S.M.Muklierji, S.P.Singh.R.P.Kapoor.

4. Reaction mechanism in Organic Chemistry, S.M.Mukhergi. S.P.Singh. 3rdedn. Macmillan.

5. Reaction Mechanism and Reagents in Organic Chemistry, Gurdeep R.Chatwal 4thedn, Himalaya Publication House.

6. Text book of Organic Chemistry, ArunBahal, S.Chand.

7. Organic Chemistry, R.Morrison and R.Boyd, 6thedn, Pearson Education 2003.

8. Organic Chemistry. T.W.GrahamSolomons, 4thedn. John Wilay. 1998.

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.Misra.

5. Nuclear Chemistry by C.V.Shekhar, Dominent-Publisher. New Delhi.

6. Essentials of physical Chemistr by B.S.Bahal, ArunBahal. G. D.Tuli.

7. Physical Chemistry by P.W.Atkins. 5thedn.Oxferd 1994 7thedn-2002.

8. Physical Chemistry b R.A.Albert and RJ.Silby, John Wiley 1995.

9. Physical Chemistry by G.H.Barrow. 5thedn, Mac GrawHill . 1988. 6thedn. 1996.

10. Physical Chemistry by W.J.Moore. 4thedn. Orient Longmans 1969.

ANALYTICAL CHEMISTRY

1. Fundamentals of Analytical Chemistry by Skoos& West.

2. Analytical Chemistry, Garry D.Christain.

3. Analytical Chemistry, Day & Underwood.

4. Analytical Chemistry by Lerry&Hergins.

5. Qualitative Analysis by A.I.Vogel, 5thedn.

F.Y.B.Sc.
Chemistry (SE CH 101)
Semester: I
SUBJECT ELECTIVE PAPER
(Agriculture Chemistry)

UNIT : 1. : FERTILIZERS

- Plant Nutrients, Major Nutrients, Minor Nutrients, Trace Nutrients
- Definition of Fertilizer
- Classification of Fertilizer
- Synthesis of N Containing Fertilizer i.e. $(NH_4)_2SO_4$, $Ca(CN)_2$, and Urea.
- Synthesis of P Containing Fertilizer i.e. Super Phosphate, Tripal Super Phosphate.
- Mix Fertilizer.

UNIT : 2. : INSECTICIDE

- Introduction
- Inorganic Insecticide
- Organic Insecticide
- Natural or Plant Insecticide
- Synthesis of DDT, BHC, Malathion.

Reference : Industrial Chemistry by B. K. Sharma

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F.Y.B.Sc.
Chemistry Practical
Laboratory Course (LC CH 101)
Semester: I

This syllabus is to be completed by assigning two laboratorysessions per week, each of two hours. Total laboratory work is 60 hrs /semester (4 hrs/week)or 15 weeks.

The number of students in the laboratory batch should notexceed fifteen (15). The medium of instruction should be English in laboratory course.

1. Organic Chemistry

1) Identification of an organic compound through the functional groupanalysis, Determination of melting point and boiling point. Preparation ofsuitable derivative.
2) Candidate should perform the analysis of at least 10 compounds.

List of compounds

- **Acids:**
  Benzoic acid.Cinnainic acid, Phthalic acid.Oxalic acid.Succinic acid.
- **Phenols:**
  α - Napthol. β -Naphthol.
- **Bases:**
  p-Toludine, Diphenylamine. Aniline.Methyl aniline.
- **Neutrals:**
  Naphthalene, Anthracene,Acetamide,Benzamide, Acetanilide, m-Dinitrobenzene, Urea,Thiourea, Toluene. Acetone, Benzaldehyde, Methy acetate, Ethyl acetate.Ethanol, 1-Propanol, Glycerol, Chloroform. Carbon tetrachloride, Chlorobenzene, Nitrobenzene.

2. Standardization

1) Preparation of standard solution of succinic acid and standardization of NaOH / KOH solution.
2) Preparation of standard solution of $Na_2S_2O_3$ and standardization of I_2 solution.
3) Preparation of standard solution of EDTA and estimation of Ca^{+2} / Mg^{2+}in $CaCl_2$ / $MgCl_2$ solution.
4) Preparation of standard solution of Oxalic acid and standardization ofKMnO$_4$ solution.
5) Preparation of standard solution of $K_2Cr_2O_7$ and standardization ofFeSO$_4$ solution.

3. Demonstrations

- Preparation of standard stock solution by w / v method and their differentdilutions.
- Preparation of standard stock solution of HCI by v/v method and theirdifferent dilutions.

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Faculty of Science

B. Sc.

FOUNDATION COMPULSORY

ENGLISH

Syllabus/ scheme

Semester – 1

Sem./CBCS/Grading pattern

w. e. f. June-2020

SCHEME OF EXAMINATION

BACHALOR OF SCIENCE PROGRAMME

SEMSTER-I

F C 103

Q.1-(A) One long question with an internal option (from unit –I)   **(8)**

Q.1-(B) Attempt five short questions out of eight   (from unit-I)   **(10)**

**Q.2- Fill in the blanks with multiple choice. Five blanks from each grammatical topic of unit II.
    (Ten out of twelve)**   **(10)**

Q.3 An unseen paragraph for comprehension with short questions   **(7)**

B Sc Semester I

<u>Course Level Learning Outcomes:</u>

To encourage students to learn and appreciate language through Short Stories/Essays

To encourage and develop reading habits in Under Graduate Students.

To introduce Under Graduate students to important themes and issues

To enable students to learn basic grammar through the practice of prescribed topics

To encourage students to read and comprehend short passages

To enable students to write short answers

<u>**Course Content:**</u>

Unit 1

Lesson 1 to 5

    Science and Reading - Frank Bros. & Co.

Unit 2

Grammar

 Articles,

 Primary Auxiliaries (Do, Have, Be) Comprehension

 Unit 3

 Comprehension of an Unseen Passage

<u>**Recommended Reading**</u>

High School English Grammar- Wren and Martin

Contemporary English Grammar- David Green

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NAAC A (3.02) State University

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Faculty of Science

B. Sc. Mathematics

Syllabus/ scheme

Sem. – 1

Sem./CBCS/Grading pattern

w. e. f. June-2020

Details of B.Sc. Programme Syllabus
CBCS-Semester-Grading pattern: Course Structure

SEMESTER-I

Courses	Courses	Credit/Course	Teaching hrs. Total	Total Credits	Examination			Total Marks
					Internal	External	Hours	
Principle/Core Course: CCMAT-111	1	4	4	4	30	70	2.5	100
Practical/PCMAT-111	1	2	4	2	-	50	-	50
Elective Opt. Disciplinary: ESMAT-11 (Set Theory & Functions)	1	2	2	2	-	50	2	50
Elective Generic	1	2	2	2	-	50	2	50
Foundation Course	1	2	2	2	15	35	2	50

Instructions:

- It is advised to use computer program like Matlab, Excel, GeoGebraetc for the generation of graphical outputs of practical related to drawing of a graphs of the given functions in the course PCMAT-111.

Details of B.Sc. Programme Syllabus
Under CBCS-Semester-Grading pattern system

Mathematics : Semester-1
Course :CC MAT-111

[In force from June2020]

UNIT 1: Successive Differentiation:

Successive Derivatives, Some standard results for n^{th} derivatives, Leibnitz's Theoremand its examples, Cauchy's Mean Value Theorem, Taylor's Theorem(without proof),Maclaurin's series and its examples.Expansion ofpowerseries ofsinx,cosx,e^x.

UNIT 2: Integration:

Reduction formula : $\int\limits_{0}^{\pi/2} \sin^n \theta \, d\theta$, $\int\limits_{0}^{\pi/2} \cos^n \theta \, d\theta$, $\int\limits_{0}^{\pi/2} \sin^m \theta . \cos^n \theta \, d\theta$, $m, n \in N$

Application of definite integrals to (a) Summation of the series, (b) Rectification(c) Volume.

UNIT 3:Vector analysis and Polar co-ordinates system :

(a) Vector analysis: scalar and vector product of three vectors, product of fourvectors, reciprocal vectors, vector differentiation, gradient, divergent andcurl.
(b) Polar co-ordinates, spherical and cylinder coordinates and their relations.

UNIT 4: Sphere, Cone and Cylinder:

(a) **Sphere:**plane section of sphere, intersection of two spheres, intersection ofsphereand line, power at a point, tangent plane and normal. Plane of contact,angle ofintersection of two spheres, condition of orthogonality.
(b) **Cone:**Definition of cone,vertex,guiding curve, generators, equation of acone witha givenvertex and a guiding curve, right circular cone with givenvertex,axis and semi vertical angle.
(c)**Cylinder:**Definition of a cylinder, equation of a cylinder whosegeneratorsintersect a givencone and are parallel to a given line, equation of a rightcircular cylinder.

Reference Books:

(1) Differential Calculus, by Shantinarayan.
(2) Integral Calculus, by Shantinarayan.
(3) Vector Analysis, by Murry R. Spiegel.
(4) Vector Analysis, by Dr.K.S.Rawat, SARUP &SONS, DELHI
(5) Introduction to Vector Analysis, Fifth Edition, by Herry F. Davis, Arther David Saider.

B.Sc. Programme
CBCS-Semester-Grading pattern
Mathematics : Semester-1
Course :PC MAT-111

Unit1: Practical based on tracing curves (Trigonometric function, Inversefunction, Exponential function, Logarithmic function, Hyperbolic function)

Unit2: Practical based on successive differentiation, Cauchy Mean value theorem, Taylor's& Maclaurin's theorem,

Unit3: Practical based on integral and reduction formula, Summation of the series, Rectification, Volume.

Unit4: Practical based on Sphere, Cone, Cylinder, Application of gradient, divergentand curl.

List of Practicals :
Unit-1 (1)Draw the graph of sin x, cos x, tan x, cot x, secx, cosecx .
(2) Draw the graph of $\sin^{-1}x$, $\cos^{-1}x$, $\tan^{-1}x$, $\cot^{-1}x$, $\sec^{-1}x$, $\mathrm{cosec}^{-1}x$.
(3) Draw the graph of sinh x, cosh x, tanh x, cothx.
(4) Draw the graph of $\log_a x$& a^x, $a \in R^+$-{1}.
(5) Draw the graph of cardioids, asteroid.
Unit-2 (1)Find the nth derivative of the given function at given point.
(2) Application of Leibnitz theorem.
(3) Application of Cauchy Mean value theorem.
(4) Application of Taylor's theorem.
(5) Application of Maclaurin's theorem.
Unit-3(1)Application of Reduction formula for integration.
(2)Summationof series using integration.
(3) Applicationof rectification by using integration.
(4) Applicationof surface revolution using integration.
Unit-4(1) Application of gradient & divergent.
(2) Application of curl.
(3)Application on Sphere.
(4) Application on Cone.
(5) ApplicationonCylinder.

Course :PC MAT-111

Instructions: Strictly follow the instructions given by examiner.
1. Draw the graphs any two out of three from unit-I (10 Marks)
2. Attempt any two out of three from unit-II (10 Marks)
3. Attempt any two out of three from unit-III (10 Marks)
4. Attempt any two out of three from unit-VI (10 Marks)
    5. (a) Viva   (5 Marks)
       (b) Journal   I/c. (5 Marks)
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B.Sc. Programme
CBCS-Semester-Grading pattern
List of Elective (Mathematics Subject) Course
(Credits-2)
Subject Elective Course : ESMAT-11
[Set Theory & Functions]

Unit-1:Set Theory

Sets and subsets, Basic set operations, Sets of numbers, Product sets, Indexed sets, Union and intersection of indexed collections, Principle of duality, Bounded and unbounded sets.

Unit-2:Functions

Definitions, Operators,transformations, Range, one-one Functions, onto functions,Identity function, constant functions, composition of functions (product of functions), Inverseof function, Setfunctions, Real valued functions, algebra of real valued functions,characteristic function.

References :

1. Set Theory & Related Topics.

By. Seymour Lipschutz, McGraw-Hill book Company,Singapur

2. Business Mathematics

By.D.C.Sancheti&V.K.Kapoor, Sultan Chand &Sons Publications, New Delhi.

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY

NAAC A (3.02) State University

PATAN- 384265

Faculty of Science

B. Sc. Microbiology

Syllabus/ scheme

Sem. – 1

Sem./CBCS/Grading pattern

w. e. f. June-2020

Semester-1

MB-101: INTRODUCTION TO MICROBIOLOGY AND MICROBIAL DIVERSITY
(THEORY)

TOTAL HOURS: 60

CREDITS: 4

Unit 1 History of Development of Microbiology

No. of Hours: 16

Development of microbiology as a discipline. Spontaneous generation *vs.* biogenesis. Contributions of Anton von Leeuwenhoek, Louis Pasteur, Robert Koch, Joseph Lister, Alexander Fleming Role of microorganisms in fermentation, Germ theory of disease, Development of various microbiological techniques and golden era of microbiology, Development of the field of soil microbiology: Contributions of Martinus W. Beijerinck, Sergei N. Winogradsky, Selman A.Waksman Establishment of fields of medical microbiology and immunology through the work of Paul Ehrlich, Elie Metchnikoff, Edward Jenner

Unit 2 Diversity of Microorganisms

No. of Hours: 16

Systems of classification: Binomial nomenclature, Whittaker's five kingdom and Carl Woese's three kingdom classification systems and their utility General characteristics of different groups: Acellular microorganisms (Viruses, Viroids, Prions) and Cellular microorganisms (Prokarya: Archaea and Bacteria, Eukarya : Algae, Fungi and Protozoa) giving definitions and citing examples Protozoa : Methods of nutrition, locomotion & reproduction - Amoeba, *Paramecium* and *Plasmodium*

Unit 3 Techniques in Microbiology

A. Microscopy

No. of Hours: 10

Bright Field Microscope, Dark Field Microscope, Phase Contrast Microscope, Fluorescence Microscope, Transmission Electron Microscope, Scanning Electron Microscope

B. Control of microorganisms

No. of Hours: 10

Physical *methods of microbial contro l*: Moist Heat, Autoclave, Dry Heat, Hot Air Oven, Tyndallization, Filtration. Radiation *Chemical methods of microbial control*: disinfectants, types and mode of action

Unit 4 An overview of Scope of Microbiology

No. of Hours: 8

SUGGESTED READING

1. Tortora GJ, Funke BR and Case CL. (2008). Microbiology: An Introduction. 9th edition. Pearson Education
2. Madigan MT, Martinko JM, Dunlap PV and Clark DP. (2014). Brock Biology of Microorganisms. 14th edition. Pearson International Edition
3. Cappucino J and Sherman N. (2010). Microbiology: A Laboratory Manual. 9th edition. Pearson Education Limited 4.Wiley JM, Sherwood LM and Woolverton CJ. (2013) Prescott's Microbiology. 9th Edition. McGraw Hill International.
4. Atlas RM. (1997). Principles of Microbiology. 2nd edition. WM.T.Brown Publishers.
5. Pelczar MJ, Chan ECS and Krieg NR. (1993). Microbiology. 5th edition. McGraw Hill Book Company.
6. Stanier RY, Ingraham JL, Wheelis ML, and Painter PR. (2005). General Microbiology. 5th edition. McMillan.

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B.Sc. Microbiology (CBCS PATTERN)   – Proposed curriculum

Semester-1

SEMESTER –I (PRACTICALS)

TOTAL HOURS: 60   **CREDITS: 2**

1 Microbiology Good Laboratory Practices and Biosafety.
2 To study the principle and applications of important instruments (biological safety cabinets, autoclave, incubator, BOD incubator, hot air oven, light microscope, pH meter) used in the microbiology laboratory.
3 Preparation of culture media for bacterial cultivation.
4 Sterilization of medium using Autoclave and assessment for sterility
5 Sterilization of glassware using Hot Air Oven and assessment for sterility
6 Sterilization of heat sensitive material by membrane filtration and assessment for sterility.
7 Demonstration of the presence of microflora in the environment by exposing nutrient agar plates to air.
8 Study of *Rhizopus, Penicillium, Aspergillus* using temporary mounts
9 Study of *Spirogyra* and *Chlamydomonas, Volvox* using temporary Mounts
10 Study of the following protozoans using permanent mounts/photographs: *Amoeba, Entamoeba, Paramecium* and *Plasmodium*

(3)

B.Sc. Microbiology (CBCS PATTERN) – Proposed curriculum

Semester-1

SUBJECT ELECTIVE
MB-SE-101 : VIROLOGY (THEORY)

TOTAL HOURS: 30

CREDITS: 2

Unit 1 Nature and Properties of Viruses

No. of Hours: 13

Introduction: Discovery of viruses, nature and definition of viruses, general properties, concept of viroids, virusoids, satellite viruses and Prions. Theories of viral origin Structure of Viruses: Capsid symmetry, enveloped and non-enveloped viruses Isolation, purification and cultivation of viruses Viral taxonomy: Classification and nomenclature of different groups of viruses

Unit 2

A. Bacteriophages

No. of Hours: 10

Diversity, classification, one step multiplication curve, lytic and lysogenic phages (lambda phage) concept of early and late proteins, regulation of transcription in lambda phage

B. Applications of Virology

No. of Hours: 7

General principles of viral vaccination, Use of viral vectors in cloning and expression, Gene therapy and Phage display

SUGGESTED READING
1. Dimmock, NJ, Easton, AL, Leppard, KN (2007). Introduction to Modern Virology. 6th edition, Blackwell Publishing Ltd.
2. Carter J and Saunders V (2007). Virology: Principles and Applications. John Wiley and Sons.
3. Flint SJ, Enquist, LW, Krug, RM, Racaniello, VR, Skalka, AM (2004). Principles of Virology, Molecular biology, Pathogenesis and Control. 2nd edition. ASM press Washington DC.
4. Levy JA, Conrat HF, Owens RA. (2000). Virology. 3rd edition. Prentice Hall publication, New Jersey.
5. Wagner EK, Hewlett MJ. (2004). Basic Virology. 2nd edition. Blackwell Publishing.
6. Mathews. (2004). Plant Virology. Hull R. Academic Press, New York.
7. Nayudu MV. (2008). Plant Viruses. Tata McGraw Hill, India.
8. Bos L. (1999) Plant viruses-A text book of plant virology by. Backhuys Publishers.
9. Versteeg J. (1985). A Color Atlas of Virology. Wolfe Medical Publication.

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HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY

NAAC A (3.02) State University

PATAN- 384265

Faculty of Science

B. Sc. Geology

Syllabus/ scheme

Sem. – 1

Sem./CBCS/Grading pattern

w. e. f. June-2020

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

N. Gujarat,INDIA.

NAAC Accreditation

Grade–"A"

FACULTY OF
SCIENCE
GEOLOGY
SYLLABUS

(Effective from June-2020)

B.Sc. (Semester I Programme)

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

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

Its objectives are as under:

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

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N. Gujarat,INDIA.

NAAC Accreditation

Grade–"A"

FACULTY OF

SCIENCE

GEOLOGY

SYLLABUS

(Effective from June-2020)
Common Formula for Question Paper (Core Course)

Time: 2.5 Hours Total Marks: 70

Theory Examination Pattern (Core Course):

Que. No: 1	A: Write any one out of Two Questions.	**09 Marks**
	B: Write any one out of Two Questions.	**09 Marks**
Que. No: 2	A: Write any one out of Two Questions.	**09 Marks**
	B: Write any one out of Two Questions.	**08 Marks**
Que. No: 3	A: Write any one out of Two Questions.	**09 Marks**
	B: Write any one out of Two Questions.	**09 Marks**
Que. No: 4	A: Write any one out of Two Questions.	**07 Marks**
	Write Ten Short questions / M.C.Q / Short numerical / diagram (Three Questions to be asked from each Unit).	**10 Marks**

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Grade–"A"

FACULTY OF

SCIENCE

GEOLOGY

SYLLABUS

(Effective from June-2020)

Common Formula for Question Paper (Elective Course)

Time: 2 Hours

Total Marks: 35

TheoryExaminationPattern (Elective Course):

Que. No: 1	A: Write any two out of Three Questions. (Each of 06 marks)	**12 Marks**
Que. No: 2	A: Write any two out of Three Questions. (Each of 06 marks)	**12 Marks**
Que. No: 3	Write any Eleven out of Twelve Short question / M.C.Q / Short numerical / diagram (Three Questions to be asked from each Unit).	**11 Marks**

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GEOLOGY

PRACTICAL

(Effective from June-2020)
GEO 101 PR-1

Common Formula for Question Paper (Practical Course)

Time: 05 Hour   Total Marks: 50

Practical Examination Pattern:

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

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

3. Determine the specific gravity of minerals by using walker steel Yard and Jolly's spring Balance.

4. Viva-voce.

5. Journal Work.

Design and Structure of Geology (Earth Sciences) UG Courses for Choice Based Credit System to be implemented from June 2020

	HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN					
	B. Sc. Three year (General) Programme with 144 credits Semester-I and II in **GEOLOGY** from June-2020					
	General pattern/scheme of study components along with credits					
Study Components		Instru. Hrs/ Week	Examination			Cr edi ts
			Internal Marks	UNi. Exam. Marks	Total Marks	
Semester – I						
	Core Compulsory (CC) Course					
GEO 101	General and Physical Geology, Mineralogy	4	30	70	100	4
CC-II-1	Core Course	4	30	70	100	4
CC-III-1	Core Course	4	30	70	100	4
	Practical core (PC) Course					
GEO 101 PR-1	Mineralogy Lab.	4		50	50	2
PC-II-1	Practical Core Course	4		50	50	2
PC-III-1	Practical Core Course	4		50	50	2
	Foundation Course (FC)					
FG	Compulsory English (L.L.)	2	15	35	50	2
	Elective Course (EC)					
EG	Elective (Generic) Course	2	15	35	50	2
GEO (CSE)	Elective (Geology) Course- Historical Geology	2	15	35	50	2
		30	135	465	600	24

F. Y. B.Sc.

Semester I

GEOLOGY - THEORY and PRACTICALS

Course-wise detail syllabus

GEO 101: General and Physical Geology, Mineralogy

Unit	Course details
Unit –1	EARTH AS A PLANET: General principles of geology as a science. Branches & scope of subject. Earth as a member of solar system – shape, size, mass and density of the earth – its movements. Origin of the earth – review of the different theories. Origin of the universe and evolution of the solar system.
Unit –2	EARTH'S INTERNAL STRUCTURE: Earth's internal structure, constitution, composition and formation. Brief introduction to Radioactivity and age of the Earth. Introduction to Convection in the earth's interior and earth's magnetic field. Elementary ideas of continental drift and plate tectonics.
Unit - 3	PHYSICAL GEOLOGY: Weathering, erosion, denudation, transportation and deposition. Introduction to Geological agents – Glaciers, Rivers, Lakes, Winds.
Unit – 4	MINERALOGY: Chemical bonding and compound formation. Definition, Classifications and Physical properties of minerals.

Reference Books:
1) Introduction to Physical Geology, A. K. Datta, Kalyani Publisher, New Delhi.
2) A Text Book of Geology, P. K. Mukerjee, World press.
3) A Text Book of Geology with Special Reference to India, G. B. Mahapatra.
4) General Geology, V. Radhakrishnan (1987), V.V.P. Publishers, Tuticorin.
5) Geomorphology, Enayat Ahmed, Kalyani Publisher, New Delhi.
6) Principles of Geomorphology, W. D.Thornbury (1969), John Willey Inc.
7) Principles Physical Geology, Arthur Holmes (1978), ELBS.
8) Engineering and General Geology, Parbin Singh (1994), S.K. Kataria and Sons, Delhi.

9) Rutley's Elements of Mineralogy, H. H. Read, CBS publishers.
10) Introduction to Rock Forming Minerals, R. A. Deer, R. E. Howie and J. Zussman (1978), The English Language Book Society.

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GEO 102 (CSE): Historical Geology

Unit	Course details	Credits
Unit–1	Historical geology-Concept, Earth's Age, Understanding of origin and evolution of life.	1
Unit–2	Concepts of geological time and Geologic Time Scale. Major events of mass extinction.	1

GEO 101 PR-1: Mineralogy Lab.

Course details
Study of the physical properties of the minerals – Megascopic identification of the following common rock forming minerals: Quartz, amethyst, chalcedony, agate, jasper, orthoclase, microcline, plagioclase, muscovite, biotite, garnet, hornblende, augite, tourmaline, olivine, chlorite. Ores – magnetite, hematite, chromite, pyrolusite, pyrite, galena, sphalerite, bauxite. Determination of specific gravity of minerals – by Walker Steel Yard Balance and Jolly's spring Balance.

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY

NAAC A (3.02) State University

PATAN- 384265

Faculty of Science

B. Sc. Physics

Syllabus/ scheme

Sem. – 1

Sem./CBCS/Grading pattern

w. e. f. June-2020

PROGRAMME SPECIFIC OUTCOMES TO BE ATTAINED AT THE END OF THE PROGRAMME

The Board of Studies in Physics recognizes that curriculum, course content and assessment of scholastic achievements play important roles in shaping education. The committee is of the view that assessment should support and encourage the broad instructional goals such as basic knowledge of the discipline of Physics including phenomenology, theories and techniques, concepts and general principles. This should also support the ability to ask subjective questions and to obtain its solutions by use of qualitative and quantitative reasoning and by experimental investigation. With this in mind, we aim to provide a firm foundation in every aspect of Physics ranging from a broad spectrum of modern trends in Physics to experimental, computational and mathematical skills of students. Hence, the UG (B.Sc.) syllabi has been framed in such a way that it bridges the gap between the plus two and PG (M.Sc.) levels of Physics by providing a more comprehensive and logical framework in almost all areas of basic Physics.

Aims of the the programme:

- To make students eligible for Higher Studies and professional courses.
- To develop the skills required to gather information from resources and use them.
- To develop the abilities to read, understand and interpret physical information – verbal, mathematical and graphical.
- To provide an intellectually stimulating environment to develop skills and enthusiasms of students to the best of their potential.
- To give need based education in physics of the highest quality at the undergraduate level.
- To offer courses to the choice of the students.
- To enable students to perform experiments and interpret the results of observation, including an assessment of experimental uncertainties.
- To make students eligible for government job.

Objectives:
By the end of the first year (2nd semester), the students should have attained a common level in basic of physics to complement the core for their future courses and developed their experimental and data analysis skills through experiments at laboratories.

LEARNING OUTCOME :

SEM EST ER	CO UR SE	UNIT	UNIT TITLE	OUTCOMES
SEMESTER – 1	CC-PHY-101	1	Vector Algebra and Vector analysis:	Recall the principles and basic equations and apply them to solve problems. Understand the concepts and significance of Scalar and Vector Fields. Learns operations with operator ∇. Learns about Gauss's Divergence Theorem, Stoke's Theorem and Derivation of Green's Theorem.
		2	Simple Harmonic Oscillations	Understand the concepts of Simple Harmonic Oscillations and combination. Understand the concepts of Damped Oscillations and Forced Oscillations and its applications.
		3	D.C. Circuits, Network Theorem & AC Bridges:	Learns and recalls the basic concepts of Circuits and its functioning. Learns Network theorems and recalls the basic concepts and principles of Network analysis. Apply theorems to construct and solve electrical circuits
		4	Rectifier and filter circuits:	Learns and recalls the basic principles and working of various rectifier and filter circuits. Learns about Zener diode, its characteristics and applications.
	ES-PHY-01		Instrumentation Measurement and analysis	This course is to get exposure with various aspects of instruments and their usage. Learns about basics of Measurement: Instruments accuracy, precision, sensitivity, resolution range etc. Errors in measurements. Learns about the construction, working and use of various measuring instrument.

Hemchandracharya North Gujarat University, Patan
B.Sc. Programme (CBCS-Semester-Grading pattern)
Semester End Examination
Format for Question paper : Elective Courses (Subject) in Physics

BSc : SEM I & II

Time: 2Hrs   Total Marks: 35

W.E.F. June – 2020

Structure of the Paper in Examination

There will be two questions each of 12 marks. Third question will be of 11 marks.
First question will be from Unit – I.
Second question will be from Unit – II.
Third question will be from Unit – I. and Unit-II.
All the questions are detailed as under.

1 (a) Attempt any one out of two.   (Theory questions)   06   Marks

   (b) Attempt any two out of three. (Application/Example/Problem)   06   Marks

2 (a) Attempt any one out of two.   (Theory questions)   06   Marks

   (b) Attempt any two out of three. (Application/Example/Problem)   06   Marks

3 (a) Attempt any three out of five. (Short question)   06   Marks

   (b) Attempt any five out of eight. (objective/ MCQ)   05   Marks

TOTAL 35 MARKS

Hemchandracharya North Gujarat University, Patan

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

Semester End Examination

Format for Question paper Core Compulsory Courses in Physics

(B.Sc. Sem - I & II)

(W.E.F.   JUNE - 2020)

The university examination paper consists of four questions.

First question is of 18 marks and will be from Unit – I.

Second question is of 17 marks and will be from Unit – II.

Third question is of 18 marks and will be from Unit – III.

Forth question is of 17 marks and will be from Unit – IV.

All the questions are detailed as under.

Time: 2.5 Hrs   **Total Marks: 70**

1 (a) Attempt any two out of three. (Theory questions)   12 Marks

  (b) Attempt any one out of two. (Application/Example/Problem)   04 Marks

  (c) Attempt any two out of three or anyone out of two. (Short question)   02 Marks

2 (a) Attempt any two out of three. (Theory questions)   12 Marks

  (b) Attempt any one out of two. (Application/Example/Problem)   03 Marks

  (c) Attempt any two out of three or anyone out of two. (Short question)   02 Marks

3 (a) Attempt any two out of three. (Theory questions)   12 Marks

  (b) Attempt any one out of two. (Application/Example/Problem)   04 Marks

  (c) Attempt any two out of three or anyone out of two. (Short question)   02 Marks

4 (a) Attempt any two out of three. (Theory questions)   12 Marks

  (b) Attempt any one out of two. (Application/Example/Problem)   03 Marks

  (c) Attempt any two out of three or anyone out of two. (Short question)   02 Marks

Hemchandracharya North Gujarat University, Patan

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

Semester End Examination

Format for Question paper Core Compulsory Courses in Physics

(B.Sc. Sem - I & II)

(W.E.F.   JUNE - 2019)

The university examination paper consists of four questions.

First question is of 18 marks and will be from Unit – I.

Second question is of 17 marks and will be from Unit – II.

Third question is of 18 marks and will be from Unit – III.

Forth question is of 17 marks and will be from Unit – IV.

All the questions are detailed as under.

Time: 2.5 Hrs   **Total Marks: 70**

1 (a) Attempt any one out of two. (Theory questions)   07 Marks

  (b) Attempt any one out of two. (Application/Example/Problem)   04 Marks

  (c) Attempt any two out of three. (Short answer)   04 Marks

  (d) Attempt any three out of four. (MCQ)   03 Marks

2 (a) Attempt any one out of two. (Theory questions)   06 Marks

  (b) Attempt any one out of two. (Application/Example/Problem)   04 Marks

  (c) Attempt any two out of three. (Short answer)   04 Marks

  (d) Attempt any three out of four. (MCQ)   03 Marks

3 (a) Attempt any one out of two. (Theory questions)   07 Marks

  (b) Attempt any one out of two. (Application/Example/Problem)   04 Marks

  (c) Attempt any two out of three. (Short answer)   04 Marks

  (d) Attempt any three out of four. (MCQ)   03 Marks

4 (a) Attempt any one out of two. (Theory questions)   06 Marks

  (b) Attempt any one out of two. (Application/Example/Problem)   04 Marks

  (c) Attempt any two out of three. (Short answer)   04 Marks

  (d) Attempt any three out of four. (MCQ)   03 Marks

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B.Sc. Three Year Programme with 144 credits

Pattern to be implemented from June- 2020

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

Part/ Class	Course code	Study Components	Instruction Hrs/ Week	Examination			Credit
				Internal	Uni. Exam	Total	
First Year B.Sc.		**Semester-I**					
		Core Compulsory (CC) Course					
	CC-I-1	Core Course-I (Paper-1)	4	30	70	100	4
	CC-II-1	Core Course-II (Paper-1)	4	30	70	100	4
	CC-III-1	Core Course-III (Paper-1)	4	30	70	100	4
		Practical Core (PC) Course					
	PC-I-1	Practical Core Course-I (Paper-1)	4		50	50	2
	PC-II-1	Practical Core Course-II (Paper-1)	4		50	50	2
	PC-III-1	Practical Core Course-III (Paper-1)	4		50	50	2
		Foundation Course (FC)					
	FC-1	Foundation (Compulsory) course (Generic) - English (L.L.)	2	15	35	50	2
		Elective Course (E)					
	EC-1	Elective (**Generic**) Course –I	2	15	35	50	2
	EC-2	Elective (**Subject**) Course –I	2	15	35	50	2
			30	**135**	**465**	**600**	**24**
First Year B.Sc.		**Semester-II**					
		Core Compulsory (CC)Course					
	CC-I-2	Core Course-I (Paper-1)	4	30	70	100	4
	CC-II-2	Core Course-II (Paper-1)	4	30	70	100	4
	CC-III-2	Core Course-III (Paper-1)	4	30	70	100	4
		Practical Core (PC) Course					
	PC-I-2	Practical Core Course-I (Paper-1)	4		50	50	2
	PC-II-2	Practical Core Course-II (Paper-1)	4		50	50	2
	PC-III-2	Practical Core Course-III (Paper-1)	4		50	50	2
		Foundation Course (FC)					
	FC-2	Foundation (Compulsory) course (Generic) - English (L.L.)	2	15	35	50	2
		Elective Course (E)					
	EC-3	Elective (**Generic**) Course -II	2	15	35	50	2
	EC-4	Elective (**Subject**) Course –II	2	15	35	50	2
			30	**135**	**465**	**600**	**24**

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HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN
CBCS - Semester - Grading Pattern
B. Sc. :: PHYSICS :: SEMESTER-I
CC PHY-101
(In force from June 2020)

Unit -1

Vector Algebra & Vector Analysis
- Dyadic (1.10) Scalar Triple product (1.11) Reciprocal vectors (1.12) vector. Triple product (1.13) Pseudo vectors and Pseudo Scalars.(1.16)
- Differentiation of a vector with respect to time (2.2) Integration of vector , Line Integral (2.3 a) , Surface Integral (2.3 b) Partial differentiation (2.4) , Gradient of a scalar point function (2.5), Divergence of vector (2.6), The equation of continuity (2.7) Curl of a vector (2.8) , More about the vector differential operator ∇ (2.9) , Multiple Del operations (2.11) Irrotational AND Solenoidal vectors (2.12) Some useful identities (2.13), Gauss' Theorem (2.14) , Green's theorem (2.15) , Stokes Theorem (2.17) Physical Significance of the Curl of a vector.
- Related Examples & Problem.
- **Basic Reference**
- Introduction to Classical Mechanics by R.G. Takwale & P.S. Puranik Tata McGraw-Hill Publishing Company Ltd.
- **Other Reference**
- Electricity and Magnetism By K.K.Tewari
- Mathematical method in physical sciences by M.L. Boas (john Willey & Sons)

Unit – 2

Simple Harmonic Oscillations,
- Composition of two simple Harmonic Motions along the same direction of the same frequency (2.8) , Two simple Harmonic Motions act upon a particle simultaneously having no phase difference but they differ in frequency by very small amount (2.9) Composition of two simple Harmonic Motions acting upon a particle simultaneously at right angles to each other, same time period but different in phase (2.10) lissajous figure (2.11) , Experimental determination of lissajous figures : (2.12 a and 2.12 b) Related Examples & Problem
Motion Due to a constant force (3.2), The Force acts for short time and to find its effect (3.3 A particle executing S.H.M. is acted upon by a harmonic force $FsinpT$ of frequency $\frac{p}{2\pi}$) (3.4), Motion in a resisting medium (3.5), Forced Vibration(3.6 a),Amplitude Resonance: Maximum Displacement of the system (3.7) , Maximum energy of the system : Velocity Resonance (3.8), Phase of the forced vibration(3.9), Power supply at steady state of forced vibration (3.10)
Related Examples & Problem
- Compound Pendulum & Oscillations Bar pendulum – (Element of Properties of matter by D.S Mathur)

Basic Reference :-
A Text Book On Oscillations , Wave and Acoustics by M. Ghosh & D. Bhattacharya (S. Chand & Company LTD.) (for Simple Harmonic Oscillations)
Other Reference :-
1. Waves and oscillations By N. Subhramanyam & Brij lal (Vikas Publishing House Pvt. Ltd, New Delhi)

2. Introduction to Classical Mechanics by R.G. Takwale & P.S. Puranik (for Damped & Forced Oscillations)

Unit -3

D.C Circuit , Network Theorem & AC Bridges

D.C Circuit
- Simple R-L Circuit – Growth and decay of current Helmholtz equitation (11.24) , R-c Circuit (11.25),Measurement of high resistance by method of leakage (11.26), Comparison of capacities by De Sauty's Method (11.27), Ideal L-C. Circuit (11.28) , Series LCR Circuit (Change case only) (11.29).
- Related Examples & Problem

Network Theorem
- Superposition Theorem (18.5), Thevenin's Theorem (18.6), Norton's Theorem (18.7), Maximum Power Theorem (18.8)
- Related Examples & Problem

AC Bridges.
- AC Bridges (17.5) AC Bridges for the measurement of inductances (17.6)
   - (1) Maxwell Bridge   (2) Anderson Bridge ,
- A.C Bridge for the measurement of capacitance (17.7)
   - (1) De Sauty's A.C Bridge (2) Schering Bridge,
   Related Examples & Problem

Basic Reference :-
   Electricity and magnetism by K.K. Tewari (S. Chand & Company Ltd)

Other Reference :-
1. Electrical Circuit Analysis by Sony and Gupta
2. Network Analysis by G.K. Mittal. (Khanna Publications)
3. Electricity and Magnetism by D. C. Tayal

# Unit- 4

Rectifier and Filter Circuits
- The Half Wave Rectifier (2.2) , Voltage Regulation (2.3), Ripple Factor (2.4) , Ratio of Rectification (2.5), Transformer utilization factor (2.6) , Disadvantage of Half Wave Rectifier (2.7), The Full Wave rectifier (2.8), The Bridge Rectifier (2.9), Comparison of Rectifiers Circuit (2.11),
- The Inductor Filter (3.1), Experimental Determination of Ripple Factor (3.2),The Capacitor Filter (3.3), Ripple Factor (Approximate method) (3.4), Ripple Factor (Accurate method), (3.5), Effect of capacitor Series Resistance (3.7), The Choke input Filter (3.9), Ripple factor in LC filter (3.10), Value Of critical inductance (3.11), the CLC filter (3.13), Comparison of filter circuits (3.14),
- Zener diode and its characteristics (6.1) , The Voltage regulator circuit (6.3), Effect of Temperature on Zener diode (6.7)
- Related Examples & Problem

Basic Reference
   Electronic Device & Circuits by Allen Mottershead , (PHI Pvt. LTD)

Other Reference
1. Electronics and Radio Engineering by M.L.Gupta.
2. Basic Electronis and Linear circuits by Bhargva Kulshreshth & Gupta TMH Edition
3. Elements of Electronics by Bagde & Singh.
4. Hand book of Electronics by Gupta and Kumar
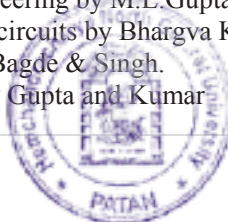
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HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN
CBCS - Semester - Grading Pattern
B. Sc. :: PHYSICS :: SEMESTER-I
Elective (Subject) Courses
ES PHY-01
Instrumentation Measurement and analysis
(In force from June 2020)

UNIT-I:
Vernier Calipers: Introduction, Theory, Figure, Description of the instrument, Detail study of Least count, Errors, Positive error, negative error, Determination of magnitude of positive and negative errors.

Micrometer Screw: Introduction, Theory, Figure, Description of the instrument, Definition of pitch and its determination, study of least count, Meaning of the error and explanation of positive and negative errors. Determination of positive and negative errors. Method of taking observation with the help of Micrometer Screw.

Spherometer : Introduction, Theory, Figure, Description of the instrument, To determine the pitch of the screw, To determine the least count of the spherometer, Zero error, Derivation of the formula for the radius of curvature of a curved surface.

UNIT-II
Wheatstone Bridge: Introduction, Theory with figure, The figure of meter bridge used in laboratory, construction of Meter bridge.

Post-Office box: Introduction, Theory, Circuit Diagram, Theoretical Circuit diagram, explanation of working with necessary formula.

Construction of Galvanometer: Introduction, Theory, Sensitivity and Figure of Merit of Galvanometer.

Spectrometer: Introduction, Construction and explanation of three main parts of Spectrometer, Mercury Discharge lamp, Sodium Discharge lamp, The adjustment, leveling and the method of recording the observation of Spectrometer.

Book for Study: Experimental Book for Physics.

LABORATORY EXPERIMENTS

1. Damping coefficient, Relaxation and quality factor in the damped motion a   simple Pendulum.
2. Study of Resonator: Verification of relation $n^2 (V + k\nu)$ = constant and determine the frequency of unknown fork.
3. Determination of Moment of inertia of a Fly wheel.
4. Verification of Stefan Boltzman's fourth power law using A.C. /D.C. Source.
5. Determination of the capacitance 'c' of a condenser.
6. Study of the series resonance with frequency variation.
7. P-N Junction diode as Half Wave Rectifier (i) Without filter (ii) With Series Inductor Filter (iii) With Shunt Capacitor Filter. Calculation of percentage of regulation.
8. V-I characteristics of Zener diode and its use as Voltage regulator.
9. Verification of Thevenin's theorem.
10. Arrangement of Spectrometer for parallel rays using Schuster method, Calibration of the spectrometer and determines the wavelength of unknown line of Hg-spectrum.
11. Refractive index of liquid using convex lens.
12. Analysis of error.

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NAAC A (3.02) State University

PATAN- 384265

Faculty of Science

B. Sc. STATISTICS

Syllabus/ scheme

Semester – 1

B.SC. SEM-I

Programme Name	Bachelor of Science
Semester	First
Paper No.	CC-STAT-101
Course name	Descriptive Statistics – I
Course Type	Core
Effective From	June – 2020

Unit No.	Content	Marks	Credit
1	**Data Types and Classification** Types of data: Primary, Secondary, Internal and External data and their sources. Designing a questionnaire schedule. Classification of data: Qualitative, Quantitative: Discrete, Continuous; Chronological (Time series) data. Nominal, Ordinal, Interval and Ratio data. Frequency: grouped and ungrouped data; Construction of frequency and cumulativefrequency distribution. Presentation of qualitative data: Tabulation (up to four attributes).	25%	1
2	**Representation of Data** Graphical representation of grouped data: Histogram, frequency curve, frequency polygon, ogives (cumulative frequency curves), Diagrammatic representation of data: Bar diagrams- simple Bar, multiple bar,sub-divided bar and percentage bar diagrams.Two dimensional diagrams: Rectangles and Pie diagrams.	25%	1
3.	**Measures of Central Tendency** Concept of central tendency, various measures of central tendency and their inter relationship. Their merits and demerits. Empirical relation between mean, median and mode. Properties and applications of measures of central tendency. Partition values.	25%	1
4.	**Measures of Dispersion and Moments** Concept of variation/dispersion, Absolute and relative measures of dispersion with their merits, demerits and applications. Moments: raw moments, central moments, factorial moments and their interrelationship. Skewness, Kurtosis and their measures. Stem - Leaf plot and box plot.	25%	1

Reference Books for Paper STA-101:

1. Statistical analysis: Graphs and diagrams, S. M. Nair and M. Garg, Spectrum books (P) Ltd, New Delhi.
2. Introduction to the Practice of Statistics, Moore, S. David; McCabe, P. George W. H. Freeman and Company, New York.
3. Basic Statistics, Agarwal, B. L., New Age International (P) Ltd.
4. Introduction to the theory of Statistics, Mood, A. M., Greybill, F.A., Boes, D.C., McGraw Hill.
5. Fundamentals of Mathematical Statistics, S. C. Gupta and V. K. Kapoor, Sultan Chand and Sons, New Delhi.

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B.SC. SEM-I

Programme Name	Bachelor of Science
Semester	First
Paper No.	PC-STAT-101
Course name	Descriptive Statistics – I (Practical)
Course Type	Core
Effective From	June – 2020

Unit No.	Content	Marks	Credit
1.	**Manual** 1. Classification of the variable/data into various category and tabulation. 2. Construction of frequency table (one way and two way). 3. Data visualization: Histogram, frequency curve, frequency polygon, ogives (cumulative frequency curves), Bar Diagrams, Pie Diagram, Stem - Leaf and box plot. 4. Problems based on measures of central tendency. 5. Problems based on measures of dispersion.	50%	1
2.	**Computer** 1. Classification of the variable/data in to various category and tabulation. 2. Construction of frequency table (one way and two way). 3. Data visualization: Histogram, Frequency curve, frequency polygon, ogives (cumulative frequency curves), Bar Diagrams, Pie Diagram, Stem - Leaf and box plot. 4. Problems based on measures of central tendency. 5. Problems based on measures of dispersion.	50%	1

Programme Name	Bachelor of Science
Semester	First
Paper No.	ES-STAT-11
Course name	Quantitative Techniques
Course Type	Elective Opt.
Effective From	June – 2020

Unit No.	Content	Marks	Credit
1.	**Decision Theory :** Introduction - Components of Decision - Making – Decision Rules (Maxi-max, Mini-max, Laplace, Horwitch), Decision under uncertainty, Pay of matrix, EMV method, Concepts of EVPI and EPPI.	50%	1
2.	**Replacement Problem :** Introduction - Replacement policy for equipment which detoriate gradually (when value of money remains constant) – Replacement of items when fails suddenly – Group replacement – Staff Replacement – Simple Illustrations.	50%	1

References :
1. Quantitative Techniques by P.C. Tulsian, Pearson Education
2. Quantitative Techniques by N. D. Vohra, McGraw Hil

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Faculty of Science

B. Sc. Zoology

Syllabus/ scheme

Sem. – 1

Sem./CBCS/Grading pattern

w. e. f. June-2020

The proposed new structure for B. Sc. course is based on Choice Based Credit System (CBCS) which is in force June-2020.

CBSC Course Pattern

1. This programme is divided into **Six Semesters** (Three Years). The duration of an academic year consists of two semester, each of 15 weeks for teaching. The academic session in each semester will provide 90 teaching days. Each semester has 24 credits and the programme is comprised of total 144 credits.

2. There will be five categories of courses/papers in this programme: CC- Core Course, PC- Practical Core, EG- Elective Generic, ES- Elective Subject and FC- Foundation Compulsory.

3. The theory courses with 4 credits shall have 60 hrs of direct classroom teaching workload (15 weeks × 4). The theory courses with 3 credits shall have 45 hrs of teaching workload (15 weeks × 3) and the theory courses with 2 credits shall have 30 hrs of teaching workload (15 weeks × 2).

Attendance: The attendance rules will be as per the rules and regulation of Hemchandracharya North Gujarat University, Patan.

Medium of Instruction: The medium of instruction shall be Gujarati but students are free to write answers in Gujarati or English in examination.

Language of question paper: Question paper should be drawn in Gujarati and English translation of the questions must be given in the question paper.

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Structure of question paper

1. For four credit course: each syllabus is of 4 units having equal weightage.
2. For two credit course: each syllabus is of 2 units having equal weightage.
3. For question paper of 70 marks (4 credits): each question paper shall have 6 questions:

	Total marks	
Q. 1	14	Must be drawn from Unit 1 and will have one long question of 14 marks OR two short questions of 7 marks each
Q. 2	14	Must be drawn from Unit 2 and will have one long question of 14 marks OR two short questions of 7 marks each
Q. 3	07	10 short questions must be drawn from Unit 1 & 2, out of which student has to answer any 7.
Q. 4	14	Must be drawn from Unit 3 and will have one long question of 14 marks OR two short questions of 7 marks each
Q. 5	14	Must be drawn from Unit 4 and will have one long question of 14 marks OR two short questions of 7 marks each
Q. 6	07	10 short questions must be drawn from Unit 3 & 4 out of which student has to answer any 7.
Total	**70**	

4. For question paper of 35 marks (2 credits): each question paper shall have 3 questions:

	Total marks	
Q. 1	15	Must be drawn from Unit 1 and will have one long question of 15 marks OR three short questions of 5 marks each.
Q. 2	15	Must be drawn from Unit 2 and will have one long question of 15 marks OR three short questions of 5 marks each.
Q. 3	5	7 short questions must be drawn from Unit 1 & 2, out of which student has to answer any 5.
Total	**35**	

B. Sc. Semester I

Course	Course code	Paper title	Exam duration (Hours)	External marks	Internal marks	Total marks	Teaching hours per week	Credit points
Paper-I	ZL-CC-101	Non-chordates I: Protista to Pseudocoelomates	2.30	70	30	100	4	4
Paper-II	CC-2	Core Course -2	2.30	70	30	100	4	4
Paper-III	CC-3	Core Course -3	2.30	70	30	100	4	4
Practical Paper-I	ZL-PC-101	Practical (Non-chordates I: Protista to Pseudocoelomates)	More than 4 hours	50	00	50	4	2
Practical Paper-II	PC-2	Practical Core Course -2	More than 4 hours	50	00	50	4	2
Practical Paper-II	PC-3	Practical Core Course -3	More than 4 hours	50	00	50	4	2
Foundation compulsory.	FC	Compulsory English	2.00	35	15	50	2	2
Generic elective	EG	Generic elective	2.00	35	15	50	2	2
Elective subject Course	ZL-ES-101 **OR** ZL-ES-102	Wetland Ecology **OR** Human Disease and Control	2.00 2.00	35 35	15 15	50 50	2 2	2 2
Total				**465**	**135**	**600**	**30**	**24**

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ZL-CC-101 NON-CHORDATES I: PROTISTA TO PSEUDOCOELOMATES

Unit 1   **15 hrs**

1. Grades of body organization: level of organization, body symmetry, formation of germ layers, formation of coelom, body segmentation.
2. General characteristics and classification of protozoa (up to class)
3. Type study: Paramecium (habit and habitat, body structure, locomotion, nutrition, respiration, excretion and reproduction)
4. Life cycle of *Plasmodium*

Unit 2   **15 hrs**

1. General characteristics and classification of phylum porifera (up to class)
2. Canal system and types of spicules in sponges
3. General characteristics and classification of phylum cnidaria (up to class)
4. Type study: *Hydra* (habit and habitat, external and internal structure, digestive system, respiration, excretion, nervous system, reproduction and regeneration)

Unit 3   **15 hrs**

1. General characteristics and classification of phylum platyhelminths (up to class)
2. Type study: *Fasciola* (habit and habitat, structure, digestive system, respiration, excretion, nervous system, reproduction)
3. General characteristics and classification of phylum nematoda (up to class)
4. Type study: *Ascaris* (habit and habitat, structure, digestive system, respiration, excretion, nervous system, reproduction)

Unit 4   **15 hrs**

1. Protozoan related diseases: infestation, symptoms and treatment (Amoebiasis, Giardiasis, Malaria)
2. Coral and coral reefs
3. Classification and adaptations of parasites
4. Platyhelimithes and nematod related diseases: infestation, symptoms and treatment (Cysticercosis, Ascariasis, Filariasis)

References

1. Hickman C. P., et al. (2006) Integrated principals of Zoology, McGraw Hill Higher Education. 931pp. 14th edition.
2. Pechnik J. A. (2015) Biology of the Invertebrates, McGraw Hill Higher Education. 555 pp. 7th edition.
3. Jordan E. L. and Verma P. S. (1993) Invertebrate Zoology, S. Chand publishing. New Delhi.
4. EkambaranathaAyyar, M. and T.N. Ananthakrishnan, (1992) Manual of Zoology Vol. 1 (Invertebrata), parts I and II.S. Viswanathan (Printers and Publishers) Pvt. Ltd; Madras. 2.

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ZL-ES-101 WETLAND ECOLOGY

Unit 1   **15 hrs**

1. History and classification of wetlands
2. Types of wetlands; Tidal marshes, mangroves and freshwater marshes
3. Human impact and management of wetlands
4. Wetlands laws and protection

Unit 2   **15 hrs**

1. Important wetlands of the world
2. Important wetlands of India
3. Important wetlands of Gujarat
4. Threats to the wetland habitat

References

1. Mitsch W. J. and Gosselink J. G. (2015) Wetlands, Wiley publications, 747 pp.
2. Chatrath K. S. J. (1997) Wetlands of India South Asia Books.
3. Kamboj R. D. and Tatu K. (2017) Important wetland destinations of Gujarat-A guide for ecotourist to explore some wetland jewels in Gujarat, GEER foundation, Gandhinagar.

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ZL-ES-102 HUMAN DISEASE AND CONTROL

Unit 1   **15 hrs**

1. Types of diseases: communicable and non communicable disease
2. Disease vector and their mode of transmission
3. Important disease vectors
4. Epidemic diseases

Unit 2   **15 hrs**

1. Human diseases caused by bacteria and their preventions
2. Human diseases caused by protozoan and their preventions
3. Human diseases caused by parasites and their preventions
4. Human genetical disorders

References

1. Temparo C. D. and Lewis M. A. (2000) Diseases of the Human Body: Third Edition F.A. Davis Company, 450 pp
2. Cheng T.C. (1964) The Biology of animal parasites, Saunders International Student Edition
3. Panikar C.K.J (1988) 5. The Parasitology of Trematodes Oliver and Boyd Ltd. Edinburgh.
4. Sood Pamnik (1993) Parasitology (Protozoology and Helminthology) CBS Publication and Distrubution, Delhi

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ZL-PC-101 NON-CHORDATES I: PROTISTA TO PSEUDOCOELOMATES

List of practical

1. Study of classification of protozoans (up to class) using laboratory specimens, models, slides, charts.

2. Study of classification of phylum porifera (up to class) using laboratory specimens, models, slides, charts.

3. Study of classification of phylum cnidaria (up to class) using laboratory specimens, models, slides, charts.

4. Study of classification of phylum platyhelminthes (up to class) using laboratory specimens, models, slides, charts.

5. Study of classification of phylum nemetoda (up to class) using laboratory specimens, models, slides, charts.

6. Study of external morphology of *Paramecium* and preparation of whole mount slide of *Paramecium* from culture.

7. Examination of pond water collected from different places for diversity in protista

8. Study of adult *Fasciola hepatica*, *Taenia solium, Ascaris lumbricoides* and its life stages (Slides/micro-photographs)

9. Study of different body systems of *Hydra, Fasciola* and *Ascaris* using models, slides and charts.

10. Study of human parasitic diseases related to protozoan, platyhelmithes and nematode.

11. Field trip and report preparation

PRACTICAL EXAM SKELETON

B. Sc. Semester I (Zoology)

Practical: ZL-PC-101 Non-chordates I: Protista to Pseudocoelomates

Time: 5 hours   Total marks: **50**

Date:

1. Examine the sample of pond water under microscope and show different protists to examiner…………………………………………………………………………..**07**

OR

Prepare slide of paramecium from given culture and show it to examiner …………......**07**

2. Draw, label the diagram of given system of particular animal and describe location and functions of different organs in brief.……………………………...……………**07**

3. Do as directed………………………………………………………………..**21**
    1. Identify and classify the specimen up to class and describe its morphological characters.
    2. Identify and classify the specimen up to class and describe its morphological characters.
    3. Identify and classify the specimen up to class and describe its morphological characters.
    4. Identify and classify the specimen up to class and describe its morphological characters.
    5. Identify and classify the specimen up to class and describe its morphological characters.
    6. Identify and describe life stage of given specimen
    7. Identify the specimen describe details of disease caused to human by it.

4. Viva voce…………………………………………………………………………**05**

5. Journal…………………………………………………………………………..**05**

6. Field trip report submission…………………………………………………………**05**