HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY

NAAC A (3.02) State University

PATAN- 384265

Faculty of Science

B. Sc. Biotechnology

Syllabus/ scheme

Sem. – 2

PROGRAM CODE : HNGU1064

Sem./CBCS/Grading pattern

w. e. f. June-2020

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

➤ **CC- BT-201   Biochemistry**
Elective Course
EC-1   Bioethics and Biosafety
EC-2   Developmental Biology
EC-3 Animal Biodiversity

B.Sc. (Biotechnology) Semester-2

CC- BT-201 Biochemistry

LEARNING OUTCOMES:

- ➢ The structure and function of specialized proteins and enzymes
- ➢ The relationship between the structure and function of specific biological molecules
- ➢ How enzymes are regulated
- ➢ The main principles of metabolic biochemistry concepts
- ➢ How homeostasis is controlled in the body
- ➢ The function of specific anabolic and catabolic pathways and how these pathways are controlled and interrelated

UNIT I: (10 Periods)

Carbohydrates: Structure, Function and properties of Monosaccharides, Disaccharides and Polysaccharides. Homo & Hetero Polysaccharides, Mucopolysaccharides, Bacterial cell wall polysaccharides, Glycoprotein's and their biological functions

UNIT II (10 Periods)

Lipids: Structure and functions –Classification, nomenclature and properties of fatty acids, essential fatty acids. Phospholipids, sphingolipids, glycolipids, cerebrosides, gangliosides, Prostaglandins, Cholesterol.

UNIT III (10 Periods)

Protein: Primary and Secondary structure of protein, tertiary and quaternary structure of protein, biological functions. structure of myglobin and hemoglobin.

UNIT IV (10 Periods)

Nucleic acids: Structure and functions: Physical & chemical properties of Nucleic acids, Nucleosides & Nucleotides, purines & pyrimidines,. Biologically important nucleotides, Double helical model of DNA structure and forces responsible for A, B & Z – DNA, denaturation and renaturation of DNA

SUGGESTED READING

Berg, J. M., Tymoczko, J. L. and Stryer, L. (2006). Biochemistry. VI Edition. W.H Freeman and Co.

Buchanan, B., Gruissem, W. and Jones, R. (2000) Biochemistry and Molecular Biology of Plants. American Society of Plant Biologists.

Nelson, D.L., Cox, M.M. (2004) Lehninger Principles of Biochemistry, 4th Edition, WH Freeman and Company, New York, USA.

Hopkins, W.G. and Huner, P.A. (2008) Introduction to Plant Physiology. John Wiley and Sons.

Salisbury, F.B. and Ross, C.W. (1991) Plant Physiology, Wadsworth Publishing Co. Ltd.

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PCC-1-I PRACTICALS
CC- BT-201 Biochemistry

1. Preparation of Standard solution
2. Preparation of buffer solution and use of pH meter
3. Qualitative tests for Carbohydrates
4. Qualitative tests for Amino acids
5. Estimation of reducing sugar
6. Estimation of Non-reducing Sugar
7. Quantitative estimation of Proteins
8. Quantitative estimation of Nucleic

Elective (Generic) Course-1 Bioethics and Biosafety

LEARNING OUTCOMES:

This course is designed to give knowledge on IPR & Bioethics.

UNIT-I (15 Periods)

Introduction to Indian Patent Law. World Trade Organization and its related intellectual property provisions. Intellectual/Industrial property and its legal protection in research, design and development. Patenting in Biotechnology, economic, ethical and depository considerations. Entrepreneurship: Selection of a product, line, design and development processes, economics on material and energy requirement, stock the product and release the same for making etc. The basic regulations of excise: Demand for a given product, feasibility of its production under given constraints of raw material, energy input, financial situations export potential etc.

UNIT II (10 Periods)

Bioethics – Necessity of Bioethics, different paradigms of Bioethics – National & International. Ethical issues against the molecular technologies.

Biosafety– Introduction to biosafety and health hazards concerning biotechnology. Introduction to the concept of containment level and Good Laboratory Practices (GLP) and Good Manufacturing Practices (GMP).

SUGGESTED READING

Sateesh MK (2010) Bioethics and Biosafety, I. K. International Pvt Ltd.

Sree Krishna V (2007) Bioethics and Biosafety in Biotechnology, New age international publishers

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Elective (Subject) Course-2 DEVELOPMENTAL BIOLOGY

LEARNING OUTCOMES:
This course is designed to give understanding of various molecular aspects of developmental biology to bachelor students.

UNIT I   **(10 Periods)**
Definition, scope & historical perspective of development Biology, Gametogenesis – Spermatogenesis, Oogenesis Fertilization - Definition, mechanism, types of fertilization. Different types of eggs on the basis of yolk.

Cleavage: Definition, types, patterns & mechanism Blastulation: Process, types & mechanism Gastrulation: Morphogenetic movements– epiboly, emboly, extension, invagination, convergence, de-lamination. Formation & differentiation of primary germ layers, Fate Maps in early embryos.

UNIT II   **(20 Periods)**
Differentiation: Cell commitment and determination- the epigenetic landscape: a model of determination and differentiation, control of differentiation at the level of genome, transcription and post-translation level Concept of embryonic induction: Primary, secondary & tertiary embryonic induction, Neural induction and induction of vertebrate lens.

Neurulation, notogenesis, development of vertebrate eye. Fate of different primary germlayers Development

SUGGESTED READING

Gilbert, S. F. (2006). Developmental Biology, VIII Edition, Sinauer Associates, Inc., Publishers, Sunderland, Massachusetts, USA.

Balinsky, B.I. (2008). An introduction to Embryology, International Thomson Computer Press.

Kalthoff, (2000). Analysis of Biological Development, II Edition, McGraw-Hill Professional.

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Elective (Subject) Course-3 Animal Biodiversity

UNIT I

Outline of classification, General features and important characters consider for classification. introduction to phylum of invertebrates

UNIT II

chordates general characters and classification Urochordata or Tunicata, Cephalochordata and Vertebrata. Cyclostomata Chondrichthyes class reptilia and amphibian, avis and mammal

SUGGESTED READING

1. Hall B.K. and Hallgrimsson B. (2008). Strickberger's Evolution. IV Edition. Jones and Bartlett Publishers Inc.

2. Kardong, K.V. (2005) Vertebrates Comparative Anatomy, Function and evolution. IV Edition. McGraw-Hill Higher Education.

3. Kent, G.C. and Carr R.K. (2000). Comparative Anatomy of the Vertebrates. IX Edition. The McGraw-HillCompanies.

4. Weichert, C.K. (1970). Anatomy of Chordate. McGraw Hill.

5. Young, J.Z. (2004). The life of vertebrates. III Edition. Oxford university press.

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HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY

NAAC A (3.02) State University

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Faculty of Science

B. Sc. Chemistry

Syllabus/ scheme

Sem. – 2

Sem./CBCS/Grading pattern

w. e. f. June-2020

B.Sc. Semester - II
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	- -

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F.Y.B.Sc.

Chemistry. (CC CH 201)

Semester: II

UNIT:1 :(A) : COORDINATION COMPOUNDS

- Definition
- Nomenclature of Complex.
- Werner's theory and its experimental verification.
- Concept of Effective Atomic Numbers (E.A.N.) for Coordination Compounds.
- Limitations of Valence bond theory of transition metal Complexes.
- An Elementary idea of(C.F.T.) Crystal field splitting of d-orbital in Oh and Td.
- Factors affecting to the crystal field splitting.
- Application of common complexes & chelates.

(B) :ACTINIDE.

- Electronic Configuration.
- Oxidation state.
- Synthesis of $^{239}_{94}Pu$, $^{241}_{94}Pu$.

UNIT: 2 :STEREO CHEMISTRY OF ORGANIC COMPOUNDS

Introduction of Stereo Isomers;

- Optical isomerism :

  General, Discussion of elements of symmetry, Molecular chirality, Enantiomers, Optical activity, Properties of enantiomers, Chiral and achiral molecules with two stereogenic centers, Diastereomers, Threo andErythrodiastereomers, Meso compounds.

- Geometrical isomerism:

  Definition and general discussion of geometric isomers, General methods of structure determination (physical methods), E-Z nomenclature (Simple illustration should be given).

- Conformational isomerism:

  Definition, Conformational analysis of ethane, n-butane with rotational andtortional diagram, Conformation of cyclohexane, Axial and equitorial bonds, Newmann projection, Show horse formula, Fisher & flying wedge formula, Difference between conformation andconfiguration.
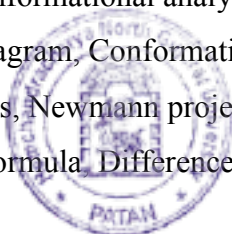
Unit: 3:CHEMICAL KINETICS.

- Introduction of following terms.
- Rate of reaction, Order of reaction, Molecularity.
- Rate equation for second order reaction. (a=b) & (a≠b).
- Characteristics of second order reaction.
- Rate equation for third order reaction(a = b = c)
- Characteristics of third order reaction.
- Concective reaction.
- Parallel reaction.
- Reversible reaction
- Numerical.

Unit :4: ANALYTICAL CHEMISTRY

- Introduction to Analytical Chemistry
- Classification of Classical and Electroanalytical Techniques.
- Literature of Analytical Chemistry(Names of Author and Publishers for Any Ten Books, Journals and Reviews)
- Criterion for Selection of analytical Techniques.
- Analytical Data Treatment
  - ➢ Error, Types of errors, Accuracy and Precission.
  - ➢ Statistical Terms :
    Mode, Average, Median, Deviation,
    Average Deviation, Relative Average Deviation,
    Standard Deviation & Coefficient of variance.
  - ➢ Q-Test for the rejection of result and related numericals.
  - ➢ Significant figures.
  - ➢ 2.5 d and 4.0 d rules.

: 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.

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F.Y.B.Sc.
Chemistry (SE CH 201)
Semester: II
SUBJECT ELECTIVE PAPER
(Medicinal Chemistry)

UNIT: 1 : INTRODUCTION
- Introduction of drugs.
- History of medicinal chemistry.
- Classification of drugs.
- General importance of drugs.
- Drug Design.

UNIT: 2 :ANTI-MALARIAL DRUGS
- Introduction and History.
- Life cycle of Plasmodium
- Natural anti-malarial drugs :
  Role ofactivity side in quinine structure
- Classification ofanti-malarial drugs.
- Synthesis of Quinoline derivatives :
  8-Amino quinoline derivatives.
  (Plasmoquine&Pamaquine)

Reference:
1. SanshieshitAuoshadho nu Rasavan by Dr. Anamik Shah.
2. SanshleshitAuoshadho nu Rasavun by Dr. J.P.Trivedi&Dr. K.A.Thakar
3. Chemistry of Synthetic Drugs by Dyson & May.

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F.Y.B.Sc. Semester: II

Chemistry Practical (Laboratory Course) CH LC-201

This syllabus is to be completed by assigning two laboratory sessions per week.

Each of two hours. Total laboratory work is 60 hrs /sem (4 hrs /week) or 15 weeks.

The number of students in the laboratory batch should not exceed fifteen (15).

The medium of instruction should he English in laboratory course.

1. Inorganic Chemistry

Semi micro Analysis:

- Cation analysis: separation and identification of ions from group
  I, II, III-A, III-B, IV, V-A, V-B.

- Anion analysis like
  $Cl^-, Br^-, I^-, NO_3^-, NO_2^-, SO_4^{-2}, SO_3^{-2}, S^{-2}, CrO_4^{-2}, CO_3^{-2}, PO_4^{-3}$
  (Water Soluble and insoluble).

- Candidate should perform the analysis of at least 10 compounds.

2. Volumetric Titrations

1) To determine the strength of NaOH and Na_2CO_3 present in the solution
   mixture of NaOH& Na_2CO_3 and to find out their percentage composition.

2) To determine the strength of $NaHCO_3$ and Na_2CO_3 present in the solution
   mixture of $NaHCO_3$ & Na_2CO_3 and to find out their percentage composition.

3) To determine the Normality, gram/liter and molarities of $H_2C_2O_4$ $2H_2O$
   and H_2SO_4 present in the solution mixture of $H_2C_2O_4$ $2H_2O$& H_2SO_4 by
   using X N NaOH and Y N $KMnO_4$ solutions.

4) To determine the Normality, gram/liter and molarity of $H_2C_2O_4$ $2H_2O$ and
   $K_2C_2O_4$ present in the solution mixture of $H_2C_2O_4$ $2H_2O$& $K_2C_2O_4$ by
   using X N NaOH and Y N $KMnO_4$ solutions.

5) To determine the amount of Ca^{+2} and Mg^{+2} ion by EDTA solution from the mixture
   solution of $CaCl_2$ and $MgCl_2$.

3. Demonstrations

- Melting point and Boiling point of an organic compound.
- Calibration of burette and Pipette..

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Faculty of Science

B. Sc.

FOUNDATION COMPULSORY

ENGLISH

Syllabus/ scheme

Semester – 2

Sem./CBCS/Grading pattern

w. e. f. June-2020

SCHEME OF EXAMINATION

BACHALOR OF SCIENCE PROGRAMME

SEMSTER-II

F C 203

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 Paragraph Writing   (7)

Course Level Learning Outcomes:
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 enable students to compose short paragraphs and develop writing skills

Course Content:

Unit 1
Lesson 6 to 10
                Science and Reading Frank Bros. & Co.
   Unit 2
Grammar
 Prepositions,
  Conjunctions
Unit 3
Composition:
Paragraph Writing

Recommended Reading
High School English Grammar- Wren and Martin
Contemporary English Grammar- David Green

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Faculty of Science

B. Sc. Mathematics

Syllabus/ scheme

Sem. – 2

Sem./CBCS/Grading pattern

w. e. f. June-2020

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

SEMESTER-II

Courses	Courses	Credit/Course	Teaching hrs. Total	Total Credits	Examination			Total Marks
					Internal	External	Hours	
Principle/Core Course: CCMAT-122	1	4	4	4	30	70	2.5	100
Practical/PC MAT-122	1	2	4	2	-	50	-	50
Elective Opt. Disciplinary: ESMAT-12 (Business Mathematics -1)	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:

- For the course PCMAT-122 [unit-iv]: It is advised use of MATLAB programming to perform the practical.

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Unit1: De'Morve's theorem and its applications, (a) Roots of a complex Number(b) Application of Expansion of $\sin^n \theta$, $\cos^n \theta$, $n \in \mathbb{N}$ in terms of sineand cosine ofmultiples ofθ. (C)Expansion of $\sin n\theta$, $\cos n\theta$ and $\tan n\theta$ interms of sine, cosine and tangent respectively.

Unit2: (a) Exponential, Circular and hyperbolic function, Logarithmic andinversefunctions. (b) Sequence and series: Definition of sequence and series, Convergence of sequence and series, partial sum, comparisontest, ratio test, root testand its examples.

Unit3:Differential Equations:

(a) Linear differential equation $\dfrac{dy}{dx} + Py = Q$, P and Q are functions of x,

(b) Bernoulli's differential equation.

(c) Linear differential equation with constant coefficients.

Unit4:Matrices:

Introduction of Matrices,Hermitian and Skew-Hermitianmatrices, lineardependence and independence of row and column matrices, Row rank, Column rank and rank of matrix, Row- reduced Echelon form of a matrix andmatrix inversion using it.

Reference Books:

(1) Complex Variables and Appiication, by Ruel V. Churchill & James Ward
 Brown,McGraw-Hill Publishing Company, New Delhi.

(2) Complex Analysis, by J.V.DESHPANDE, Tata McGRAW-Hill Publishing
Co.Ltd. New Delhi.

(3) Theory of Matrices, by B.S.Vatssa, 2nd Edition, Wiley Easterns Ltd.

(4) Matrix Operations, by Schaum's Series McGRAW-HILL Book Co.

B.Sc. Programme
CBCS-Semester-Grading pattern
Mathematics : Semester-2
Course : PC MAT-122
[In force from June 2020]

List of Practicals:
Unit 1 :(1) Application ofDe'Morve's theorem.

(2) Application of roots of complex number.

(3) Application of $\sin^n \theta$ and $\cos^n \theta$in terms of series of sine and cosine respectively.

(4) Application of $\sin n\theta$and $\cos n\theta$in terms of series of sine and cosine.

(5) Application of $\tan n\theta$in terms of series of tangent.

Unit 2:(1) Application of Exponential, Circular and hyperbolic function

(2) Application of inverse hyperbolic function and logarithm functionof acomplex number.

(3) Application of comparison test for a given sequence.

(4)Application of root test for a given sequence.

(5) Application of ratio test for a given sequence.

Unit3:(1) Application of linear differential equation $\dfrac{dy}{dx} + Py = Q$, where Pand Qare function of x.

(2) Application ofBernoulli's differential equation.

(3) Application of linear differential equation with constant-coefficients.

Unit 4:(1)Solution of simultaneous linear equations using matrices.

(2)Application of the inverse matrix by row reduction method.

(3)Application of the rank of a matrix.

(4)Application of the rank of a matrix by transforming into echelonform.

(5) Application ofHermitian and skew-Hermitian matrices.

B.Sc. Programme
CBCS-Semester-Grading pattern
Mathematics : Semester-2
Course : PC MAT-122
[In force from June 2020

Instructions: Strictly follow the instructions given by examiner.

1. Attempt 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   (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-12
[Business Mathematics-1]

Unit 1:[Logic]

Logical Statements, Truth table, Negation, Compound statements, Tautologies and Contradiction, Negation of Compound statements, Propositions, Conditional and Biconditional statements.

Unit 2: [Permutations and Combinations]

Fundamental rules of counting, Definition ofPermutations and Permutation of n different things, Permutation of repeated things, Circular Permutation, Definition of Combination standard results and examples.

Referance books:

(1) Business Mathematics, by. D.C.Sancheti&V.K.Kapoor, Sultan Chad & Sonspublication, NewDelhi.
(2) Business Mathematics, by. B.S.ShahPrakashsan, Ahmedabad.

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PATAN- 384265

Faculty of Science

B. Sc. Microbiology

Syllabus/ scheme

Sem. – 2

Sem./CBCS/Grading pattern

w. e. f. June-2020

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

Semester-2

MB-201 : INTRODUCTION TO BACTERIOLOGY (THEORY)

TOTAL HOURS: 60   **CREDITS: 4**

Unit 1 Cell organization   No. of Hours: 20

Cell size, shape and arrangement, glycocalyx, capsule, flagella, endoflagella, fimbriae and pili.Cell-wall: Composition and detailed structure of Gram-positive and Gram-negative cell walls, Archaebacterial cell wall, Gram and acid fast staining mechanisms, lipopolysaccharide (LPS),sphaeroplasts, protoplasts, and L-forms. Effect of antibiotics and enzymes on the cell wall.Cell Membrane: Structure, function and chemical composition of bacterial and archaeal cellmembranes.Cytoplasm: Ribosomes, mesosomes, inclusion bodies, nucleoid, chromosome and plasmidsEndospore: Structure, formation, stages of sporulation.

Unit 2 Bacteriological techniques   No. of Hours: 15

Pure culture isolation: Streaking, serial dilution and plating methods; cultivation, maintenance and preservation/stocking of pure cultures; cultivation of anaerobic bacteria, and accessing non-culturable bacteria.

Unit 3 Growth and nutrition   No. of Hours: 15

Nutritional requirements in bacteria and nutritional categories;Culture media: components of media, natural and synthetic media, chemically defined media, complex media, selective, differential; indicator, enriched and enrichment media

Unit 4   Reproduction in Bacteria   No. of Hours: 10

Asexual methods of reproduction, logarithmic representation of bacterial populations, phases of growth, calculation of generation time and specific growth rate

SUGGESTED READINGS

1.   Atlas RM. (1997). Principles of Microbiology. 2nd edition. WM.T.Brown Publishers.
2.   Black JG. (2008). Microbiology: Principles and Explorations. 7th edition. Prentice Hall
3.   Madigan MT, and Martinko JM. (2014). Brock Biology of Micro-organisms. 14th edition. Parker J.,Prentice Hall International, Inc.
4.   Pelczar Jr MJ, Chan ECS, and Krieg NR. (2004). Microbiology. 5th edition Tata McGraw Hill.
5.   Srivastava S and Srivastava PS. (2003). Understanding Bacteria. Kluwer Academic Publishers, Dordrecht
6.   Stanier RY, Ingraham JL, Wheelis ML and Painter PR. (2005). General Microbiology. 5th edition McMillan.
7.   Tortora GJ, Funke BR, and Case CL. (2008). Microbiology: An Introduction. 9th edition Pearson Education.
8.   Willey JM, Sherwood LM, and Woolverton CJ. (2013). Prescott's Microbiology. 9th edition. McGraw Hill Higher Education.
9.   Cappucino J and Sherman N. (2010). Microbiology: A Laboratory Manual. 9th edition. Pearson Education Limited

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

(5)

Semester-2

SEMESTER –2 (PRACTICALS)

TOTAL HOURS: 60   **CREDITS: 2**

1. Preparation of different media: synthetic media BG-11, Complex media-Nutrient agar, McConkey agar, EMB agar.
2. Simple staining
3. Negative staining
4. Gram's staining
5. Acid fast staining-permanent slide only.
6. Capsule staining
7. Endospore staining.
8. Isolation of pure cultures of bacteria by streaking method.
9. Preservation of bacterial cultures by various techniques.
10. Estimation of CFU count by spread plate method/pour plate method.
11. Motility by hanging drop method.

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Semester-2

SUBJECT ELECTIVE

MB-SE-201 : MICROBIOLOGICAL ANALYSIS OF AIR AND WATER (THEORY)

TOTAL HOURS: 30   CREDITS: 2

Unit 1

A. Aeromicrobiology   No of Hours: 4

Bioaerosols, Air borne microorganisms (bacteria, Viruses, fungi) and their impact on human health and environment, significance in food and pharma industries and operation theatres, allergens

B. Air Sample Collection and Analysis   No of Hours: 7

Bioaerosol sampling, air samplers, methods of analysis, CFU, culture media for bacteria and fungi, Identification characteristics

C. Control Measures   No of Hours: 4

Fate of bioaerosols, inactivation mechanisms – UV light, HEPA filters, desiccation, Incineration

Unit 2

A. Water Microbiology   No of Hours: 4

Water borne pathogens, water borne diseases

B. Microbiological Analysis of Water   No of Hours: 7

Sample Collection, Treatment and safety of drinking (potable) water, methods to detect potability of water samples: (a) standard qualitative procedure: presumptive/MPN tests, confirmed and completed tests for faecal coliforms (b) Membrane filter technique and (c) Presence/absence tests

C. Control Measures   No of Hours: 4

Precipitation, chemical disinfection, filtration, high temperature, UV light

Suggested Reading

1. da Silva N, Taniwaki MH, Junqueira VC, Silveira N, Nascimento MS, Gomes RAR (2012) Microbiological Examination Methods of Food and WaterA Laboratory Manual, CRC Press
2. Atlas RM and Bartha R. (2000). Microbial Ecology: Fundamentals & Applications. 4 edition. Benjamin/Cummings Science Publishing, USA
3. Maier RM, Pepper IL and Gerba CP. (2009). Environmental Microbiology. 2 edition, Academic Press
4. Hurst CJ, Crawford RL, Garland JL, Lipson DA (2007) Manual of Environmental Microbiology, 3 edition, ASM press

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PATAN

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY

NAAC A (3.02) State University

PATAN- 384265

Faculty of Science

B. Sc. Geology

Syllabus/ scheme

Sem. – 2

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 II 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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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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N. Gujarat,INDIA.

NAAC Accreditation

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**

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

GEOLOGY

PRACTICAL

(Effective from June-2020)
GEO 201 PR-1

Common Formula for Question Paper (Practical Course)

Time: 05 Hour   **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 nicols.

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

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

	Study Components	Instru. Hrs/ Week	Examination			Cr edi ts
	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	Internal Marks	UNi. Exam. Marks	Total Marks	Cr edi ts
	Semester – II					
	Core Compulsory (CC) Course					
GEO 201	Physical Geology, Mineralogy and Petrology	4	30	70	100	4
CC-II-2	Core Course	4	30	70	100	4
CC-III-2	Core Course	4	30	70	100	4
	Practical core (PC) Course					
GEO 201 PR-1	Optical Mineralogy, Crystallography and Petrology Lab.	4		50	50	2
PC-II-2	Practical Core Course	4		50	50	2
PC-III-2	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- Basics of geomorphology	2	15	35	50	2
		30	135	465	600	24

F. Y. B.Sc.

Semester II

GEOLOGY - THEORY and PRACTICALS
Course-wise detail syllabus

GEO 201: Physical Geology, Mineralogy and Petrology

Unit	Course details
Unit –1	DYNAMICS OF THE EARTH: Volcanoes – types, causes, effects, products and distribution. Earthquakes – causes, classification, intensity, effects, seismic belts, seismograph and seismogram, prediction. Mountains – causes, types, distribution.
Unit –2	OPTICAL MINERALOGY: Nature of light, Phenomenon of polarisation, Reflection, Refraction, Double refraction, Properties of isotropism, anisotropism. Construction of Nicol prism, Petrological microscope and its parts. Passage of light through Nicol prism.
Unit - 3	CRYSTALLOGRAPHY: Definition, Characteristics, Laws of Crystallography, Interfacial angle, Elements of symmetry, Parameters system of Weiss and Miller Indices. Classifications of crystals.
Unit - 4	PETROLOGY: Magma: Definition, composition, origin; Definition and classification of rocks **Igneous rocks:** Origin, classification, common textures, composition and uses. **Sedimentary rocks:** Origin, classification, consolidation, diagenesis, fabric and textures, composition and uses. **Metamorphic rocks:** Agents, origin, classification, textures, composition and uses.

Reference Books:

1) Elements of Optical Mineralogy, N. H. Winchel, A. N. Winchel (1968), Willey,

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

3) Petrology, W. T. Haung (1962), Mc. Graw Hill.

4) Dana's Text Book of Mineralogy, Revised by W.E. Ford, Wiley Eastern Ltd., New Delhi.
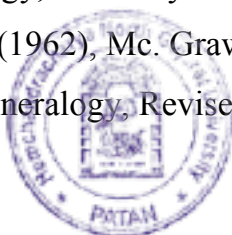
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PATAN

GEO 202 (CSE): BASICS OF GEOMORPHOLOGY

Unit	Course details	Credits
Unit–1	Geomorphology- Basic geological process and its effects on landscape.	1
Unit–2	Major depositional and erosional landforms associated with coasts, rivers and deserts..	1

GEO 201 PR-1: Optical Mineralogy, Crystallography and Petrology Lab.

Course details
Identification of the following minerals in thin sections – Quartz, orthoclase, microcline, plagioclase, muscovite, biotite.
Classification of crystals in to six types. Study of Elements of Symmetry of Eleven (11) types of symmetry.
Megascopic identification of typical rocks: Granite, Syenite, Gabbro, Rhyolite, Basalt, Conglomerate, Sandstone, Shale, Limestone, Quartzite, Marble.

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY

NAAC A (3.02) State University

PATAN- 384265

Faculty of Science

B. Sc. Physics

Syllabus/ scheme

Sem. – 2

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 :

SEMESTER – 2	**CC-PHY-201**	1	Electrostatics	Learns and understand the basics concepts and the law of electrostatics. Understand the basics concepts of electrostatic energy. Learns and understand how to determine the charge of an electron.
		2	Optics	Refraction Through Lenses This topic aims to provide necessary foundation in optics which prepares the students for an intensive study of advanced topics at a later stage. Covering the very important and fascinating areas of Refraction. Interference This topic aims to provide more specific knowledge of interference and its application.
		3	Waves & Sound	Learns and understand about theory of resonator and its application. Learns the basics of sound. Learns about ultrasonic waves, its production and applications.
		4	Thermodynamics:	Learns and recalls the basic principles and equations. Understand the basic principle and applications of laws of Thermodynamics. Learns about thermodynamic scale of temperature. Understand the central concepts of entropy. Learns how to calculate changes in various thermodynamic processes.
	ES-PHY-02		Electronic circuit elements and energy sources	Learns about various types of resistor, inductor and capacitor. Learns about various types of cells and battery. Learns about transformer working and its applications.

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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HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN

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	
		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**
		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**

The "Part/Class" column reads **First Year B.Sc.** for both Semester-I and Semester-II sections.

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PATAN

Unit -1 Electrostatics :-

Electrostatics :-

- Gauss's law (4.21), Gauss's law in Differential form (4.22), Gauss's law and Coulomb's law (4.23), Force on the Surface of a charged Conductor (4.25), Electrostatics Energy in the medium surrounding the charged conductor(4.26), Millikan's Oil Drop Method for Determination of Electronic Charge (4.29)
- Related Examples & Problem

Steady Current :-
- Current and Current density (8.6) , Conservation of charge i.e., Continuity Equation (8.8), Ohm's Law at a point (8.11), Wiedmann and franz law (8.13), The Relaxation Time (8.14)
- Related Examples & Problem

Basic Reference :-
Electricity and magnetism By K.K .Tewari   (S. Chand & Company Ltd)
Other Reference :-
1. Electricity and magnetism By Mahajan and Rangwala
2. Electricity and magnetism – Berkley Physics Course Vol- II

Unit -2   Optics

Refraction Through Lenses:-
- Principal foci (2.3), Least Possible Distance Between an objet & its real image in a convex lens(2.4), Derivation Produced by a thin lens (2.5), Equivalent Focal Length of two thin lenses Separated by a finite distance (2.6) , Cardinal points of an optical system (2.8), Principal Foci and Focal Planes (2.9), Principal points and principal planes (2.10), Nodal Point (2.11), Aberrations (3.1), Spherical aberration in a lens (3.5), Chromatic aberration (3.12).
- Related Examples & Problem

Interference :-
- Interference in thin films (8.15), Interference due to reflected light (8.16), Interference due to transmitted light (8.17), Newton's Rings (8.23), Determination of the wavelength of sodium light using Newton's Rings (8.24), Refractive index of a liquid Newton's Rings (8.25)
- Related Examples & Problem

Basic Reference :-
A Textbook of OPTICS By N. Subhramanyam & Brij lal (S. Chand & Company Ltd.)
other Reference :-
1. Optics and Atomics Physics by D.P. Khandelval (Himalaya Publishing house)
2. Principal of Optics by B.K Mathur (S. Chand & Company Ltd)
3. Optics by Ajoy Ghatak (TMH Edition)

Unit- 3 Waves & Sound

Wave:-
- Theory of Resonator (6.16), Dependence of the Frequency of resonator on the size and shape of the mouth (6.17), Velocity of transverse waves along a stretched string (7.1), law's of transverse Vibration of Strings (7.3), Melde's Experiment (7.5), Kundt's Tube (7.13), Related Examples & Problem

Sounds:-
- Musical sound and noise (7.6), Speech(7.17), Human Voice (7.18), Human Ear (7.19), Characteristics of musical sound (7.20), Intensity of sound (7.21), Measurement of intensity of sound (7.22), Bel (7.23), Phon (7.24). Related Examples & Problem

Ultrasonic waves :-
- Ultrasonic (11.23), Production of ultrasonic waves (11.24), Piezo – Electric oscillator (11.24.3), Detection of ultrasonic waves (11.25), Applications of ultrasonic waves (11.27) Related Examples & Problem

Basic Reference :-
Waves And Oscillations By N. Subhramanyam & Brij lal (Vikas Publishing House Pvt. Ltd, New Delhi) – Second Revised Edition.

Other Reference :-
1. University Physics by Sears , Zeemansky and Young (Norosa Publishing House)
2. A Text Book On Oscillations , Wave and Acoustics by M. ghosh & D. Bhattacharya (S. Chand)
3. Vibration , Waves & heat by Sears and Zeemansky.

Unit -4

Thermodynamics
- Second Law of Thermodynamics (2.8) , Carnot's theorem (2.9), Thermodynamic Scale of temperature (2.10), Identity of Perfect Gas Scale and Absolute Scale (2.11), Thermodynamics of Refrigeration (4.2)
- Entropy (2.13), Change of Entropy in a reversible process (2.14), change of entropy in an irreversible process (2.15), Principle of increase of entropy of degradation of energy (2.16), Formulation of the second law in term of entropy (2.17) , Entropy and second law (2.18)
- Third law of Thermodynamics (Nernst's heat theorem) (2.19) T-S diagram of Carnot cycle
- Calculation of Entropy of perfect gas and steam. (2.21),
- Related Examples & Problem

 Basic Reference :-

Thermodynemics and Statistical Physics by Dr. J.P. Agarwal and Satya Prakash (Pragati Prakashan)

 Other reference ;-

1. Heat and Thermodynamics by Zeemansky
2. University Physics by Sears, Zeemankky and young (Narosa Publishing House)
3. Heat and Thermodynamics by Richard H. Dittmon & Mark W. Zemansky (TMH)
4. Heat and Thermodynamics by A.B. Gupta and H. P. Roy (New Central Book)

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN
CBCS - Semester - Grading Pattern
B. Sc. :: PHYSICS :: SEMESTER-II
Elective (Subject) Courses
ES PHY-02
Electronic circuit elements And Energy Sources
(In force from June 2020)

UNIT- I PASSIVE CIRCUIT ELEMENT
 RESISTOR : Generals(6.1),Resistor type, Wire wound resistor, Carbon composition resistor, Carbon film resi. , Cermete film resi. , Metal film resi., Power resi. , Value tolerance , Variable resistor , Potentiometer and Rheostats , Fusibal resi. , Resistor color , Resi. Colour band , Resi under ten ohm , Resi. Troubles ., Checking resistor with ohmmeter.
INDUCTOR : Inductor , Comparison of different coils , Inductance of an inductance , Another definition of   inductance, Mutual inductance, Coefficient of   coupling,   Variables inductors ,Inductor in series and parallel without M , Series combination with m , Stray inductance , Energy storage magnetic field, DC Resistance of coils ,
CAPACITOR : Capacitors , Capacitor   connect to battery , Capacitance , Fators   controlling capacitance , Type of Capacitors , Fixed Capacitor , Variable capacitors , Voltage   rating of capacitors , Stray circuit cap. Likage resistance , Troubles Capa. , Chacking capa. With ohm meter ,

UNIT—II ENERGY SOURCES
CELLS AND BATTERY
        Primary   and Secondary cells and Batterys , Voltage and current of cell , Cell life , Different type of dry cells , Carban zink cell , Alkaline cell , Manganese alkaline cell , Nickal cadmium cell , , Mercury cell , Silver oxide cell ,Lead acide cell , Battery rating , Testing dry cell , Photo electric cell , Solar cell
TRANSFORMER: Transformer working , Transformer impedance, Can a Trans. Operate on DC , RF Shilding , Auto Transformer
Book- Basic Electronics by B. L. Theraja , Pub. S. Chand & Compny 3rd Edition

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN
CBCS - Semester - Grading Pattern
B. Sc. :: PHYSICS :: SEMESTER-II
PC PHY-201
(In force from June 2020)

LABORATORY EXPERIMENTS

1. Bar Pendulum : Determination of 'K' and 'g'
2. Melde's Experiment.
3. Find out Refractive index of the prism using spectrometer.
4. To determine the ratio of magnetic moments of two magnets by using Vibrational magnetometer.
5. To determine the magnetic moment of a given Bar magnet using deflection Magnetometer in Gauss A and B position.
6. Determination of self inductance 'L' of Inductor.
7. Study of parallel resonance with frequency variation.
8. Study of transformer.
9. P-N Junction diode as <u>Full</u> Wave Rectifier (i) Without filter (ii) With Series   Inductor Filter (iii) With Shunt Capacitor Filter. Calculation of percentage of Regulation.
10. Bridge Rectifier (i) Without filter (ii) With Series inductor Filter (iii) With   Shunt Capacitor Filter. Calculation of percentage of regulation.
11. Verification of Maximum power transfer theorem.
12. Decay of Potential across condenser.

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY

NAAC A (3.02) State University

PATAN- 384265

Faculty of Science

B. Sc. STATISTICS

Syllabus/ scheme

Semester – 2

Sem./CBCS/Grading pattern

w. e. f. June-2020

Programme Name	Bachelor of Science
Semester	Second
Paper No.	CC-STAT-201
Course name	Probability Theory
Course Type	Core
Effective From	Dec – 2020

Unit No.	Content	Marks	Credit
1.	**Probability** Random Experiment, trial, sample point, sample space, definition of equally likely, mutually exclusive and exhaustive events. Definition of probability: classical, relative and axiomatic approach and its properties. Conditional probability, multiplicative law of probability, independence of events, law of total probability, Bayes theorem and its applications.	25%	1
2.	**Random Variable and Generating Functions** Random Variable (rv) with its types, probability mass function (pmf), probability density function (pdf), cumulative distribution function (cdf) with illustrations. Expectation of Random variables with properties, moments, factorial moments, measures of location, skewness, kurtosis, probability generating function (pgf), moment generating function (mgf), cumulant generating function (cgf), factorial moment generating function (fmgf) with their properties and uses	25%	1
3.	**Probability Inequalities** Boole's inequality, Bonferroni's inequality, Markov's inequality, Chebyshev's inequality (one sided and two sided), concept of convex and concave functions, Jensen's inequality, Cauchy- Schwarz inequality.	25%	1
4.	**Joint Distribution** Concept of Joint Distributions, Joint probability mass function and Joint probability density function. Marginal and conditional distributions, independence of random variables, conditional expectation and conditional variance. Product moments.	25%	1

Reference Books for Paper STA-103
1. Introduction to the Practice of Statistics, Moore, S. David; McCabe, P. George W. H. Freeman and Company, New York.
2. Basic Statistics, Agarwal, B. L., New Age International (P) Ltd.
3. Introduction to the theory of Statistics, Mood, A. M., Greybill, F.A., Boes, D.C., Mc Graw Hill.
4. Fundamentals of Mathematical Statistics, S. C. Gupta and V. K. Kapoor, Sultan Chand and Sons, New Delhi.
5. Mathematical Statistics, P. Mukhopadhyay, New Central Book Agency (P) Ltd, Calcutta
6. An Introduction to Probability and Statistics, V. K. Rohatgi and A.K.Md. Ehsanes Saleh, Wiley Series.

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Programme Name	Bachelor of Science
Semester	Second
Paper No.	PC-STAT-201
Course name	Probability Theory
Course Type	Core
Effective From	Dec – 2020

Unit No.	Content	Marks	Credit
1.	**Manual** 1. Practical based on probability from the given data and bivariate table. 2. Practical based on Bayes theorem 3. Practical based on skewness and kurtosis. 4. Practical based on marginal and conditional distributions. 5. Practical based on moments of joint, marginal and conditional distributions.	50%	1
2.	**Computer** 1. Practical based on probability from the given data and bivariate table. 2. Practical based on Bayes theorem 3. Practical based on skewness and kurtosis. 4. Practical based on marginal and conditional distributions. 5. Practical based on moments of joint, marginal and conditional distributions	50%	1

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B.SC – SEM – II

Programme Name	Bachelor of Science
Semester	Second
Paper No.	ES-STAT-12
Course name	Economic Statistics
Course Type	Elective Opt.
Effective From	Dec – 2020

Unit No.	Content	Marks	Credit
1.	Introduction – Concepts of Demand Supply and Cost function – elasticity of demand, supply and Cost – Monopoly, Duopoly problem, Simple applications for profit maximization.	50%	1
2.	Utility and Utility Index with simple illustrations – elasticity of substitution for function of production – Study of production functions – properties and application for linear, Cobb – Douglas and CES production functions.	50%	1

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY

Faculty of Science

B. Sc. Zoology

Syllabus/ scheme

Sem. – 2

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 II

Course	Course code	Paper title	Exam duration (Hours)	External marks	Internal marks	Total marks	Teaching hours per week	Credit points
Paper-I	ZL-CC-201	Non-chordates II: Coelomates	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-201	Practical (Non-chordates II: Coelomates)	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-201 **OR** ZL-ES-202	Environmental Pollution and Climate Change **OR** Pest Control Technology	2.00 2.00	35 35	15 15	50 50	2 2	2 2
Total				**465**	**135**	**600**	**30**	**24**

11

ZL-CC-201 NON-CHORDATES II: COELOMATES

Unit 1   **15 hrs**

1. General characteristics and classification of phylum Mollusca (up to class)
2. Type study: *Pila* (habit and habitat, external features, digestive system, respiratory system, blood vascular system, excretory system, nervous and sensory system and reproductive system)
3. Torsion in gastropods
4. Pearl culture

Unit 2   **15 hrs**

1. General characteristics and classification of phylum annelida (up to class)
2. Metamerism in annelida
3. Type study: Leech (habit and habitat, external features, digestive system, respiratory system, excretory system, nervous system and reproductive system)
4. Economic importance of annelids

Unit 3   **15 hrs**

1. General characteristics and classification of phylum arthropoda (up to class)
2. Type study: Cockroach (habit and habitat, external features, body wall, endoskeleton, locomotion, digestive system, respiratory system, blood vascular system, excretory system, nervous and sensory system and reproductive system)
3. Metamorphosis in insects
4. Useful and harmful insects

Unit 4   **15 hrs**

1. General characteristics and classification of phylum Echinodermata (up to class)
2. Type study: sea star (habit and habitat, external features, body wall, digestive system, circulatory system, water vascular system)
3. Life history, larval development, regeneration and autotomy in star fish
4. General characteristics and classification of phylum Hemichordata (up to class)

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-201 ENVIRONMENTAL POLLUTION AND CLIMATE CHANGE

Unit 1   **15 hrs**

1. Air and Noise pollution: sources and effect
2. Water pollution: sources and effect
3. Soil pollution: sources and effect
4. Pollution control methods

Unit 2   **15 hrs**

1. Greenhouse gases and global warming
2. Acid rain and Ozone layer destruction,
3. Effect of climate change on public health
4. Mitigation efforts to deal with climate change

References

1. Verma P. S. and Agrawal V. K. (2010) Cell biology, Genetics, Molecular biology, Evolution and Ecology. S. Chand publications.
2. Singh J. S., Singh S. P. and Gupta S. R. (2014) Ecology, Environmental Science and Conservation. S. Chand publications.
3. Sharma P. D. (2003) Ecology and Environment. Rastogi Publications.

ZL-ES-202 PEST CONTROL TECHNOLOGY

Unit 1   **15 hrs**

1. Classification of pests
2. Insect pest: diversity and details of damage caused by them to human goods
3. Avian pest: diversity and details of damage caused by them to human goods
4. Mammalian pest: diversity and details of damage caused by them to human goods

Unit 2   **15 hrs**

1. Management and control of insect pest
2. Management and control of avian pest
3. Management and control of mammalian pest
4. Integrated pest management

References

1. Mathur R. 2008 Animal behaviour (Rastogi Pub.: India)
2. Shukla, G.S, and Upadhyay V.B., 2000. Economic Zoology, Rastogi Publications Meerut
3. Vasantharaj David, B., Murali Rangan. M.C. and Meera Murali Rangan 1992. Harmful and Insects, Popular Book Depot,Chennai.
4. Vasantharaj David, B. 2001. Elements of economic Entomology, Popular Book Depot, Chennai

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ZL-PC-201 NON-CHORDATES II: COELOMATES

List of practical

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

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

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

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

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

6. Study of anatomy of different systems of *Pila* using charts and models.

7. Study of anatomy of different systems of leech using charts and models.

8. Study of anatomy of different systems of cockroach using charts and models.

9. Study of anatomy of different systems of star fish using charts and models.

10. Study of histological structure of pharynx, gizzard, typhlosole and ovary of earthworm using permanent slides

11. Mounting of mouth parts of housefly, honey bee and mosquito.

12. Field trip and report preparation

PRACTICAL EXAM SKELETON

B. Sc. Semester II (Zoology)

Practical: ZL-PC-201 Non-chordates II: Coelomates

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

Date:

1. Mounting of mouth parts of given insect specimen………………………..……...**09**
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………………………………………………………………..**18**

   1) Identify and describe histological structure

   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 classify the specimen up to class and describe its morphological characters.

4. Viva voce…..………………………………………………………………………..**05**
5. Journal.…………………………………………………………………………**05**
6. Field trip report submission…………………………………………………………**05**