SEMESTER I

Course Code: CHE1B01
Core Course I: THEORETICAL AND INORGANIC CHEMISTRY - I
Total Hours: 36; Credits: 2; Hours/Week: 2

Module I: Chemistry as a Discipline of Science (6 hrs)

What is Science? - Scientific statements - Scientific methods – Observation - Posing a question - Formulation of hypothesis – Experiment – Theory – Law - Revision of scientific theories and laws - Role of concepts and models in science - Scientific revolution.

Evolution of chemistry - Ancient speculations on the nature of matter - Early form of chemistry – Alchemy - Origin of modern chemistry - Branches of chemistry -Interdisciplinary areas involving physics and biology.

Objectives of Chemical Research - Research design. Components of a research project: Introduction, review of literature, scope, materials and methods, results and discussion, conclusions and bibliography.

Module II: Some Basic Chemical Concepts (3 hrs)

Symbol of elements – Atomic number and mass number - Atomic mass – Isotopes, isobars and isotones - Molecular mass - Mole concept – Molar volume - Oxidation and reduction – Oxidation number and valency – Variable valency - Equivalent mass.

Methods of expressing concentration: Weight percentage, molality, molarity, normality, mole fraction, ppm and millimoles.

Module III: Analytical Chemistry - I (9 hrs)

Laboratory Hygiene and Safety: Storage and handling of chemicals. Simple first aids: Electric shocks, fire, cut by glass and inhalation of poisonous gases - Accidents due to acids and alkalies - Burns due to phenol and bromine. Disposal of sodium and broken mercury thermometer - Use of calcium chloride and silica gel in desiccators. Awareness of Material Safety Data Sheet (MSDS) – R & S Phrases (elementary idea only) – Safe laboratory practices – Lab safety signs.

Volumetric Analysis: Introduction - Primary and secondary standards – Standard solutions - Theory of titrations involving acids and bases, $KMnO_4$, $K_2Cr_2O_7$, I_2 and liberated I_2 - Complexometric titrations. Indicators: Theory of acid-base, redox, adsorption and complexometric indicators. Double burette method of titration: Principle and advantages.

Significant figures – Comparison of results.

Module IV: Atomic Structure (9 hrs)

Introduction based on historical development – John Dalton's atomic theory – Thomson's atom model and its limitations – Rutherford's atom model and its limitations - Failure of classical physics – Black body radiation - Planck's quantum hypothesis - Photoelectric effect - Generalization of quantum theory -

Atomic spectra of hydrogen and hydrogen like atoms - Ritz-combination principle– Bohr theory of atom – Calculation of Bohr radius, velocity and energy of an electron - Explanation of atomic spectra – Rydberg equation - Limitations of Bohr theory - Sommerfeld modification - Louis de Broglie's matter waves – Wave-particle duality - Electron diffraction - Heisenberg's uncertainty principle.

Module V: Nuclear Chemistry (9 hrs)

Natural radioactivity – Modes of decay – Group displacement law – Theories of disintegration – Rate of decay – Decay constant – Half life period – Gieger-Nuttall rule – Radioactive equilibrium – Disintegration series – Transmutation reactions using protons, deutrons, α-particles and neutrons – Artificial radioactivity – Positron emission and K electron capture – Synthetic elements.

Nuclear stability – N/P ratio – Packing fraction – Mass defect – Binding energy – Nuclear forces – Exchange theory and nuclear fluid theory – Nuclear fission - Atom bomb – Nuclear fusion – Hydrogen bomb - Nuclear reactors - Nuclear reactors in India.

Isotopes: Detection – Aston's mass spectrograph – Separation of isotopes by gaseous diffusion method and thermal diffusion method – Application of radioactive isotopes – ^{14}C dating – Rock dating – Isotopes as tracers – Study of reaction mechanism (ester hydrolysis) – Radio diagnosis and radiotherapy.

Text Books

1. Jeffrey A. Lee, *The Scientific Endeavor: A Primer on Scientific Principles and Practice*, Pearson Education, 1999.

2. C.N.R. Rao, *Understanding Chemistry*, Universities Press India Ltd., Hyderabad, 1999.

3. Robert H. Hill and David Finster, *Laboratory Safety for Chemistry Students*, 1st Edition, Wiley, Hoboken, NJ, 2010.

4. M.C. Day and J. Selbin, *Theoretical Inorganic Chemistry*, East West Press, New Delhi, 2002.

5. B.R. Puri, L.R. Sharma and K.C. Kalia, *Principles of Inorganic Chemistry*, 31st Edition, Milestone Publishers and Distributors, New Delhi, 2013.

6. Satya Prakash, *Advanced Inorganic Chemistry, Volume 1*, 5th Edition, S. Chand and Sons, New Delhi, 2012.

7. J. Mendham, R.C. Denney, J. D. Barnes and M. Thomas, *Vogel's Text Book of Quantitative Chemical Analysis*, 6th Edition, Pearson Education, Noida, 2013.

8. H.J. Arnikar, *Essentials of Nuclear Chemistry*, 4th Edition, New Age International (P) Ltd., New Delhi, 1995 (Reprint 2005).

References

1. T.F Gieryn, *Cultural Boundaries of Science*, University of Chicago Press, Chicago, 1999.

2. H. Collins and T. Pinch, *The Golem: What Everyone Should Know about Science*, Cambridge University Press, Cambridge, 1993.

3. C.R. Kothari, *Research Methodology: Methods and Techniques*, 2nd Revised Edition, New Age International Publishers, New Delhi, 2004.

4. *Guidance in a Nutshell - Compilation of Safety Data Sheets*, European Chemicals Agency, Finland, Version 1.0, December 2013.

5. D.A. Skoog, D.M. West, F.J. Holler and S.R. Crouch, *Fundamentals of Analytical Chemistry*, 8th Edition, Brooks/Cole, Thomson Learning, Inc., USA, 2004.

6. B.K, Sen, *Quantum Chemistry – Including Spectroscopy*, 3rd Edition, Kalyani publishers, New Delhi, 2010.

7. D.A. McQuarrie, *Quantum Chemistry*, 2nd Edition, University Science Books, California, 2008.

8. R.K. Prasad, *Quantum Chemistry*, 4th Edition, New Age International (P) Ltd., New Delhi, 2012.

9. J.B. Rajam and L.D. Broglie, *Atomic Physics*, 7th Edition, S. Chand and Co. Pvt. Ltd., New Delhi, 1999.

10. S. Glasstone, *Source Book on Atomic Energy*, 3rd Edition, East-West Press Pvt. Ltd., New Delhi, 1967.

Core Course I

PH1 B01: METHODOLOGY OF SCIENCE AND PHYSICS– 36 hours (Credit - 2)

(Importance must be given to Part C)

Part A: Methodology And Perspectives Of Sciences   10Hours Max marks 27

Unit I – Science and Science Studies

Types of knowledge: Practical, Theoretical, and Scientific knowledge, Information.

What is Science; what is not science; laws of science. Basis for scientific laws and factual truths.

Science as a human activity, scientific temper, empiricism, vocabulary of science, science disciplines.

Revolution in science and Technology.

Unit II – Methods and tools of science

Hypothesis: Theories and laws in science. Observations, Evidences and proofs.

Posing a question; Formulation of hypothesis; Hypothetico-deductive model, Inductive model. Significance of verification (Proving), Corroboration and falsification (disproving), Auxiliary hypothesis, Ad-hoc hypothesis.

Revision of scientific theories and laws, Importance of models, Simulations and virtual testing, Mathematical methods vs. scientific methods. Significance of Peer Review.

Reference Books:

1. Gieryn, T F. Cultural Boundaries of Science., Univ. of Chicago Press. 1999
2. Collins H. and T Pinch., The Golem: What Everyone Should Know About Science., Cambridge Uni. Press, 1993
3. Hewitt, Paul G, Suzanne Lyons, John A. Suchocki & Jennifer Yeh, Conceptual Integrated Science. Addison-Wesley, 2007
4. Newton R G. The Truth of Science: New Delhi, 2nd edition
5. Bass, Joel E and et. al. Methods for Teaching Science as Inquiry, Allyn & Bacon, 2009

Part B: Methodology and Perspectives of Physics   9Hours   Max marks 27

What does Physics deal with? - brief history of Physics during the last century-the inconsistency between experiments and theories- Birth of new science concepts - Quantum concepts-Black body radiation, Photoelectric effect, X-rays,   De Broglie waves. Sections 2.2, 2.3, 2.5, 3.1, of Arthur Beisser) *(All topics in this part require qualitative study only, derivations are not required. Detailed study not required)*

Relativity-Special relativity, Time dilation, Length contraction, Twin paradox (Sections 1.1, 1.2, 1.4, 1.5 of Arthur Beisser)

Laser- Concepts of ordinary and monochromatic light, Coherent and incoherent light, Spontaneous and stimulated emission, Metastable state, pumping and population inversion.(Basic ideas only Section 4.9 of Arthur Beisser) *(All topics in this part require qualitative study only, derivations are not required. Practical Laser not required. Detailed study not required.)*

Design of an experiment , experimentation , Observation, data collection: Interaction between Physics and technology.

References:

1. Concepts of Modern Physics- Arthur Beisser

2. A brief history and Philosophy of Physics - Alan J. Slavin- http:/ www.trentu. Ca/ academic / history- 895 .html

3. The inspiring History of Physics in the Last One Hundred Years : Retrospect and prospect Prof. Dr-lng . Lu Yongxiang http :// www.twas .org.cn/twas/proLu.asp

Part C – Mathematical Methods in Physics   17 Hours   Max marks 72

Vector Analysis: – Vector Operations - Vector Algebra – Component form – How vectors transform, Applications of vectors in Physics.

Differential Calculus: – The operator ∇ - Gradient, Divergence, Curl – Physical interpretation - Product rules of ∇ - Second derivatives.

Integral Calculus: – Line integral, surface integral and volume integral - Fundamental theorem of Gradients – Gauss's Divergence Theorem (Statement only)– The fundamental theorem of curl – Stoke's theorem(Statement only). Divergence less and curlless fields.

Curvilinear co-ordinates: – Spherical polar coordinates – cylindrical coordinates(Basic ideas).

Matrices: – Basic ideas of matrices – addition, subtraction, scalar multiplication, Transpose of a matrix, conjugate of a matrix, diagonal matrix - Representation of vectors as column matrix – Determinants – Cramer's rule – Eigen Values and Eigen Vectors - Hermitian Matrix,Unitary Matrix.

References:

1. Introduction to Electrodynamics – David J . Griffiths, Prentice Hall India Pvt. Ltd., Chapter – 1

2. Mathematical Physics - Satya Prakash, Sultan Chand &Sons, New Delhi

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FIFTH SEMESTER B. Sc. DEGREE PROGRAMME(Theory)
ZOOLOGY OPEN COURSE- I
Code: ZO5-D 01
REPRODUCTIVE HEALTH AND SEX EDUCATION
(36 hours) (2 hours per week) (2 credits)

1.Introduction (1 hrs)

Reproductive rights, Need for sex education

2.Sex determination and Chromosomal anomalies
(5hrs)

Chromosomal mechanism of sex determination, Environmental control of sex determination, Hormonal control of sex determination, Barr body, Twin studies, Sex reversal, Sex chromosomal anomalies:Turner's syndrome and Klinefilter's syndrome.

3.Sexualabuses and myths
(4hrs)

Premarital and extramarital sex, Sexual abuse and rape, Sexual perversions. Alternate orientations (Homosexuality, Lesbianism, Bisexuality Paraphilias), Oral sex, Animal sex, Cyber sex, Child abuse, Prostitution, Sexual myths, Sexual hygiene.

4.Prenatal Diagnosis
(3hrs)

Different methods (invasive and non invasive). Female foeticide: Ethical issues and laws. (Mention Prenatal Diagnostic techniques – Prevention of misuse act – PNDT Act)

5.FertilityControl (4 hrs)

Natural methods, Artificial methods, Contraceptive devices and medications, Abortion, Legal termination of pregnancy, Vasectomy, Tubectomy, Vaccines and hormones in fertility control.

6.Infertility and assisted reproductive technologie
(5hrs)

Physiological infertility, pathological infertility, causes and problems in male and female infertility. Assisted Reproductive Technologies (ART) – IVF, ET, AI, GIFT, ZIFT, ICSI, Embryo or oocyte donation. health hazards in ART, cryopreservation of blastocysts and ethics, designer baby and ethics.

7.Sexually transmitted infectious diseases
(6hrs)

Symptoms, mode of transmission, diagnosis, treatment and prophylaxis of AIDS, Syphilis, Gonorrhea, Herpes (genital), human papilloma virus and genital warts, hepatitis, gonococcal vulvo vaginitis, Trichomonal vaginitis.

Mention the term venereal disease. Socio economic dimensions of STD.

8. Ethical aspects of sex   (2 hrs)
Introduction, Healthy relationship with opposite sex, Role of counseling, Gender discrimination in family and society, Sperm bank, Ovum bank,

9.Common diagnostic techniques   (6 hrs)
Imaging techniques and purpose of imaging – Angiography, CT scanning, MRI, PET, and Ultra sound scanning.
Techniques to monitor body vital functions – EEG, ECG, LFT.
Laboratory diagnostic methods – ELISA, WESTERN BLOT.
Therapeutic methods – Endoscopies, Laser microscopy, haemodialysis, byepass surgery, angioplasty.

. Topics for Assignments and Seminars
(Topics allotted for assignments/ seminars should be considered for internal assessments only, and can be subdivided among students)
1. Sexual counseling
2. Marriage counseling
3. Population explosion and birth control
4. Functions of male and female hormones
5. Hormones of pregnancy

References
1. Prakash Kothari : *Common sexual problems and solutions*, UBS Publishers and Distributors Ltd.
2. Kinsey, sex and fraud, Judith, Edward W. Eichel, John H. Court and J. Gordon, Editors Lochinvar : Huntington House Publications.
3. Lynn L. Long, Judith A. Burnett, R. Valorie Thomas: *Sexuality counseling An integrated approach* , Pearson, Merril Prentice Hall.
4. Robert T. Francoeur: *Becoming a sexual person*, John Wiley and Sons.
5. Guyton & Hall: *Textbook of Medical Physiology*
6. Churchill Livingstone : *Davidson's Principles and Practice of Medicine.*
7. Vander, Sherman and Luciano : *Human Physiology*, McGraw Hill.
8. Vijayakumaran Nair, K.and Paul, P.I: *Animal Physiology and Biochemistry*,

FIFTH SEMESTER B. Sc. DEGREE PROGRAMME(Theory)
ZOOLOGY CORE COURSE- IX
Code: ZO5B 09 T
GENERAL METHODOLOGY IN SCIENCE, BIOSTATISTICS
AND INFORMATICS
(54 hours) (3 hrs per week) (3 credits)

Section A: GENERAL METHODOLOGY IN SCIENCE (20 hrs)

I. Science and Scientific Studies
        (1hrs)
Science as a human activity; scientific attitude; Empiricism; Science
disciplines; Interdisciplinary approach.

II. Scientific Methods   **(7 hrs)**
Major steps: Observation, Defining the problem, Collection of information,Formulation of
a hypothesis, Experimentation, Analysis of the results and Conclusion based on interpretation
of the results.
Methods in scientific enquiry: Inductive and deductive reasoning.
Hypothesis: Formulation of a hypothesis, Different thought processes in developing
hypothesis (analogy, induction, deduction and intuition),
Hypothetico-deductive model, Testing hypothesis, Auxiliary hypothesis, *Adhoc* hypothesis.
Theories and Laws in Science; Scientific evidences and Proofs; Peer reviews.
Importance of Models, Simulations and Virtual Testing.

III. Experimentation   **(6hrs)**
Types of experiments; Design of an Experiment: Principles and procedures;
Necessity of units and dimensions; Repeatability and Replications; Documentation of
experiments
Planning of Experiments: Design, selection of controls, Observational and Instrumental
requirements, Test animals used in experiments.

IV. Ethics in Science and Animal Ethics   **(6hrs)**
Scientific information: Depositories of scientific information – primary,
secondary and digital sourcesSharing of knowledge, transparency and honesty.
Reporting of observational and experimental data, Influence of observer on
observations.Publications , Patents, Plagiarism
Section 51A(G), Section 17.1(d) of the prevention of cruelty to animals. (Act of 1960)

Section-B: BIOSTATISTICS (15 Hrs)

I- Biostatistics: Definition, Scope, Role of statistics in Life Sciences,
Terminology and variables .
Sample and Sampling: Sample size, Sampling errors, Methods of sampling
Specific aspects of statistical data
i) Collection / documentation of data of the experiments:
Classification and tabulation of data
ii) Presentation of data: a) Graphic representation; Histogram, Frequency
Polygon and Frequency Curve
b) Diagrammatic representation; Line diagram, Bar diagram and Pie diagram
iii) Analysis of data:
(a) Measures of central tendency: Mean, Median and Mode Standard error
iv) Interpretation:

through the department, as per the existing rule of the University examinations.

10.0 VivaVoce

At the end of sixth semester candidate shall attend a comprehensive viva voce. The external evaluation of 12 to 15 students per day is to be conducted with one external examiner and one internal examiner. The examiners shall consult each other and award the grades according to the same criteria specified in 9.10 for the award of marks.

11.0 Requirement for passing the course

For a pass in each course the student has to secure aggregate 40% marks or E grade in internal and external. An aggregate of 40% marks (E grade with 120 credits) is required for a pass in the B.Com degree programme.

12. The fourth/fifth semester students of regular colleges shall be taken under the supervision of faculty members to business or industrial units so as to enable them to have firsthand knowledge about location, layout, managerial functions, H R management or any area of study as per curriculum. Study tour to an industrial/business centre will form part of curriculum. The report submitted by the student in this respect shall be considered as one of the assignment of any one of the courses in the concerned semester.

13.0 **In all other matters regarding the conduct of B.Com Programme in the affiliated colleges under Calicut University under Choice Based Credit Semester System which are not specified in this regulation, the common regulation CUCBCSSUG 2014 will be applicable.**

UNIVERSITY OF CALICUT

SYLLABUS OF BACHELOR OF COMMERCE DEGREE PROGRAMME UNDER CUCBCSS UG --- EFFECTIVE FROM THE 2017-18 BATCH B.COM ADMISSIONS

CORE COURSES

BCIB01 BUSINESS MANAGEMENT

Lecture Hours per week: 6

Credits: 4

Internal: 20, External: 80

Objectives:

> To understand the process of business management and its functions.

> To familiarize the students with current management practices.

> To understand the importance of ethics in business.
> To acquire knowledge   and capability to   develop ethical practices   for effective management.

Module I

Concepts of Management – Characteristics of management – Schools of management thought - Management and administration – Functions of management – Management by objectives – Management by participation – Management by exception – Management by motivation

15   Hours

Module II

Functions of Management: Planning – concept and importance - Decision making – barriers to effective planning – Organizing – concept and importance – different organization models – Span of management – Departmentation – Delegation.

20   Hours

Module III

Functions of Management: Motivation: – concept and importance – Contributions of McGregor, Maslow and Herzberg – Leadership: – Concept and styles – Leadership traits - situational theory of leadership - Communication: – process and barriers – Control: – concept steps – tools – Coordination: Concept – Principles - Techniques

20 Hours

Module IV

Business Ethics: Meaning and scope – Types of ethics – Characteristics – Factors influencing business ethics – Arguments for and against business ethics – Basics of business ethics - Corporate social responsibility - Environmental issues in business – Ethics in advertising – Globalization and business ethics.

20 Hours

Module V

Emerging concepts in management – Kaizen – TQM – TPM – MIS – ISO – Change management – Stress management – Fish bone (ISHIKAWA) Diagram – Business eco system – Logistic management.

15 Hours

Reference Books:
1. Boatwright. John R: Ethics   and the Conduct of Business, Pearson Education, New

HIS3B03 INFORMATICS AND HISTORY

Module I OVERVIEW OF INFORMATION TECHNOLOGY

Technology and Society – Print Culture to Information Technology

History of Computers – Features of Modern personal Computers and Peripherals – Hard Ware and Soft ware

Operating Systems – DOS – Windows – Open Source – Linux –

Module II NETWORK OF COMPUTERS

Computer Networks – Types – LAN, MAN, WAN, PAN – Cellular Wireless networks

The Internet and Access methods – DSL, ISDN, Wi-Fi, FIOS

Satellite Internet Access – MODEM, Web Browsers- Search Engines – Email – Chatting

Mobile Phone Technology

Mobile Computing – SMS, MMS –Wireless Applications – Blue Tooth, Global Positioning System

Module III SOCIAL INFORMATICS

Meaning and Scope of IT – Data, Information, Knowledge

IT and Society- E-Governance- New Issues and Concerns – Digital Divide

Cyber Ethics – Cyber Crimes – Cyber Laws

Free and Open Source Software Debate

Basic Concepts of IPR – Copy Rights and Patents

Social Media – Blogging – Online Activism

Module IV DIGITAL RESOURCES FOR LEARNING AND RESEARCH

Introduction to the use of IT in Teaching and Learning – in History – Digital Resources – Merits and Demerits

Academic Services - E –learning – Educational Software –Courseware- E-books – E-journals –Open Access Publishing – EDUSAT – VICTERS – Digital Libraries – INFLIBNET- NICNET- BRNET

IT in Historical Studies – Quantification and Analysis – Indus Script

Digitalizing Archives –Virtual Tour to Historical Sites – Spanish Caves

Google Earth and Google Mapping – JSTORE- ASI Site – keralahistory.ac.in- KCHR

BOOKS FOR STUDY

Module I

Alan Evans, Kendal Martin (et.al.,)Technology in Action, Pearson Prentice Hall

Peter Norton; Introduction to Computers, Indian Adapted Edition

Module II

Alan Evans, Kendal Martin (et.al.)Technology in Action, Pearson Prentice Hall

Leon Alexes and Mathews Lewon, Computer Today, Leon Vikas

Rajaramanan.V: Introduction to Information Technology, Pearson Prentice Hall

Module III

Alan Evans, Kendal Martin (et.al.,)Technology in Action, Pearson Prentice Hall

Leon Alexes and Mathews Lewon, Computer Today , Leon Vikas

Rajaramanan.V: Introduction to Information Technology, Pearson Prentice Hall

Module IV

Rajaramanan.V; Introduction to Information Technology, Pearson Prentice Hall

Rajaramanan. V; Fundamentals of Computers, Pearson Prentice Hall

Web Resources

http://computer.howstuffworks.com
http://www.technopark.org
http://www.computer.org/history/timeline
http://www.learnthenet.co Web Primer
http:/www. Studentworkzone.com/question.php?/ID=96

http://www.keralaitmission.org
http://computerhistory.org
http://www. lgta.org Office on-line lessons