# REMEDIAL MATHEMATICS

## BPH 101(A)

**1. Algebra:** Equation reducible to quadratics, Simultaneous equations (linear and quadratic), Determinations. Properties of solution of simultaneous by Cramer's rule, Matrices, arithmetic operations on matrices, pharmaceutical applications of determinants and matrices.

**2.Statistics**: Mean,Median and mode, standard deviation, correlation and Regression Analysis, curve fitting (Method of least square).

**3.Trigonometry:** Measurement of angle, T-ratios, addition, subtraction and transformation formulae, T-ratios of multiple, sub multiple, allied and certain angles. Application of logarithms in pharmaceutical computations.

**4.Analytical plane Geometry:** Certain Co-ordinates, Distance between two points, area of triangle, a locus of points, straight line, slope and intercept form, double-intercept form, normal (perpendicular form), slope-point form, general equation of first degree.

**5.Calculus:**

**(A) Differential:** Limits and functions definition of differential coefficient, Differentiation of standard functions including function (Chain rule). Differentiation of implicit functions, logarithmic differentiation, successive differentiation.

**(B)Integral:** Integration as inverse of differentiation, indefinite integrals of standard forms, integration by parts, substitution and partial fractions, formal evaluation of definite integrals.

**Books Recommended:**

1. Loney S.L., Plane Trigonomotetry.
2. Ray M., Algebra.
3. Basu K.P., Intermediate Algebra.
4. Paria G., Differential Calculus, Scholar's Publications, Indore.
5. Paria G., Integral Calculus, Scholar's Publications, Indore.
6. Paria G., Co-ordinate Geometry, Scholar's Publications, Indore.
7. D.C. Agrawal, Remedial Mathematics.
8. R.D. Agrawal, Matrix.
9. R.S. Agrawal, Intigral Calculus.
10. H.K.Pathak, Differential Calculus.

# REMEDIAL BIOLOGY
# BPH 101(B)

**1. Plant Anatomy and Physiology:**

i.Morphology and Anatomy of flowering plant and its parts like root, stem, bark, wood, leaf, flower, fruit and seed. Modification of root and stem.

ii.Transportation photosynthesis and respiration in plants, Plants growth anddevelopment.

iii.Structure of plant cell, Different types of plant tissues and their functions.

**2. Structure and functions:**

I. Cell- the unit of life.

Ii.Biomolecules - Lipids, polysaccharides, Proteins, and nucleic acids. Enzymes andcofactors, their classification, chemistry, mechanism of action and factorsaffecting enzyme activity.

Iii.Cell cycle and cell division, stages of mitosis and meiosis, and their signification.

**3. Living systems:**

I.Biological classification - Five kingdoms Monera, Prostita, Fungi, plantae andanimalia. Viruses,viroids and lichens.

ii. Animal kingdom - Classification and its basis

Iii. Plant kingdom - Algae, bryophytes, Pteridophytes, Gymnosperms,Angiosperms. Plant life cycle and alteration of generations.

4.**Genetics** :

I.Principles of inheritance and variation - Mendals laws, inheritance of one geneand two gene, sex determination, mutation and genetic disorders.

Ii. Molecular basis of inheritance - DNA, RNA, Replication, Transcription, Genetic code, Translation, regulation of gene expression, DNA fingerprinting, Human Genome Project.

**5.Evolution**:

Evolution - Origin of life, theory of evolution of life forms, Evidences forevolution, Adaptive radiation, Biological evolution, Hardy- Weinberg principal.

**List of Experiments**

1. To Study the simple and compound microscope.
2. To study the microscopic section of the Monocot and Dicot plant.
3. To identify the part of the plant by given section (root).
4. To identify the part of the plant by given section (stem).
5. To identify the part of the plant by given section (bark).
6. To identify the part of the plant by given section (leaf).
7. To identify the part of the plant by given section (seed).
8. To identify and differentiate the part of the given plant sample morphologically.
9. To Study Various parts of flower. Calyx, Corolla, androcium & gynesium.
10. To study different types of tissues ,Xylem and phloem .
11. To study various phases of mitosis using slides.

**Books Recommended:-**

1. Dutta,A.C.,A classbook of botony.
2. Kaushik M.P. , A Textbook of modernbotony
3. Verma &Pandey, ISC Biology, S.Chand
4. Saxena O.P. Zoology,AS Prakashan, Merrut.
5. Kokate C.K.,Practical Pharmacognosy.
6. Zordan and Nigam,Zoology.
7. Vidhyarth,Zoology

# COMPUTER APPLICATIONS

## BPH 102

**1.Introduction to Computer -** It's Types and uses, Computer Generations, Hardware, Software, Elements of computer system, Number Systems: - Decimal, Binary, Octal, Hexadecimal, Storage Devices - primary memory, Secondary Memory, Input and output devices.

**2.Operating System and Data Transmission -** Basic Concepts, Organization, functions, operations and types, Features of DOS, Windows and UNIX operating systems. Dos Commands.

Data Transmission:-Basis Concepts LAN, MAN, WAN, Network Topologies, TCP/IP, Worldwide web, URL, HTML. Transmission Media.

**3.Programming -** High level language, Machine languages, Syntax, semantics. Compile, Interpreter Algorithms and flowchart.

**4.Programming Language 'C' -** Data types, Constants, variable, Operators, symbolic constants, input and output, increment and decrement operators. Control Structures: while, do-while, for, if, if-else, and switch statement. Functions, header files, recursion, pointers and arrays, structures.

**5.Application software** - Word processing, formatting, printing setups, mail merge, Table Handling, picture handling, spreadsheet programs, workbooks/ worksheets, formatting of sheet, formula and functions, graphs, Import and export of files/ data. Presentation Packages, Slide designing.

**Practicals:**

Introduction to various components of computer, Use of External & Internal DOS Commands, MSOffice - MS Word, MS Excel, PowerPoint. A simple documentation preparation & printing.Usage of printer & other components.Simple programs in C.

### Books Recommended:

1. V. Rajaraman: Fundamental of computer, Iind Edition, East Economy Edition.
2. E. Balaguruseamy: Programming In C, TMH Pub
3. D.S. Yadav: Fundamentals of Information Technology, New Age Publication.
4. P.K. Sinha: Fundamentals of Computer
5. CARTER, TMH Computer Architecture (Schaum's outline) CARTER, TMH
6. Shrivastava. S., Computer Application .

# PHARMACEUTICS – I (Introduction to Pharmaceutics)

## BPH 103

**1.** History of pharmaceutical practices through ages. Various systems of medicines. Significance of pharmacopoeias with special reference to Indian, British, United States, International and Extra pharmacopoeias.

**2.** Routes of administration and classification of pharmaceutical dosage form.

**3.** Definition, general formulation, principles and procedures adopted for dispensing and official products of the followings-

Aromatic waters, Solutions, Syrups, Mixtures, Spirits, Elixirs, Linctuses, lotions, liniments, Mixtures, Geyserites, Gargles, Mouth washes, Inhalations Powders, Capsules, Tablet triturates, Ointments, Creams, pastes, Suppositories and ophthalmic, Emulsions, Suspensions, Milk and Magmas, Mucilages, Jellies, Infusions, Decoctions, Tinctures and Extracts.

**4.** Pharmaceutical Calculation: Different systems of weights and measures, Dilution and conc. of solution, Percentage solution, Calculation by allegation, Proof Spirits, Calculation of doses, Displacement value.

**5.** Detailed methods employed in the preparation of plant extractives.

**LIST OF PRACTICALS**

1. Study of Indian Pharmacopoeia, British Pharmacopoeia, United States Pharmacopoeia and Extra Pharmacopoeia.
2. Prepare and submit Camphor Water I.P.
3. Prepare and submit Chloroform Water I.P.
4. Prepare and submit Conc. Dill Water I.P.
5. Prepare and submit Aqueous Iodine Solution I.P.
6. Prepare and submit Weak Iodine Solution I.P.
7. Prepare and submit Strong Iodine Solution I.P.
8. Prepare and submit Cresol with Soap Solution I.P.
9. Prepare and submit Chloroxylenol SolutionI.P.
10. Prepare and submit Simple Syrup I.P.
11. Prepare and submit Simple Syrup U.S.P.
12. Prepare and submit Chloroform Lotion I.P.
13. Prepare and submit Simple elixir I.P.
14. Prepare and submit Calamine Lotion I.P.
15. Prepare and submit Calamine Lotion USP, oily.

16.Prepare and submit Turpentine Liniment I.P.
17.Prepare and submit Liquid Paraffin Emulsion I.P.
18.Prepare and submitTragacanth Mucilage I.P.
19.Prepare and submit Milk of Magnesia I.P.
20.Prepare and submitBentonite Magma U.S.P.
21.Prepare and submit Borax Glycerin I.P.
22.Prepare and submit Tannic acid Glycerin I.P.
23.Prepare and submitMandle's Paint. B.P.
24.Prepare and submit Simple Linctuses I.P.
25.Prepare and submit Menthol and Eucalyptus Inhalation B.P.C.
26.Prepare and submitOrange/lemon Tincture I.P.
27.Prepare and submit compounds Benzion Tincture I.P.
28.To prepare & submit codeine linctuses NFI, BNF.
29.To prepare & submit Zinc Sulphate& Zinc chloride mouthwash IP.
30.To prepare & submit Potassium permanganate gargle NFI 1979.
31.To prepare & submit salicylic acid lotion BPC.
32.To prepare Magnesium Trisilicate mixture BPC.
33.To prepare & submit Chalk mixture pediatric BPC.
34.To prepare & submit magnesium hydroxide mixture BPC.
35.To prepare & submit castor oil emulsion NFI.
36.To prepare & submit Liquid paraffin & magnesium hydroxide emulsion BPC.
37.To prepare & submit Lubricating gel.
38.To prepare & submit Peppermint water IP.
39.To prepare & submit sodium chloride solution IP.
40.To prepare & submit Sodium chloride mouthwash.
41.To prepare & submit oral rehydration salt BP.
42.To prepare & submit soap liniment.
43.To prepare & submit sodium alginate jelly.
44.To prepare & submit lubricating jelly with cellulose ether base.
45.To prepare & submit compound syrup of ferrous phosphate IP 55 (Parrish Food) by chemical interaction.

## Books Recommended

1. Indian Pharmacopoeia.
2. British Pharmacopoeia.
3. United States Pharmacopoeia.
4.Lachman, L. & Lieberman, H.A., ''Theory and Practice of Industrial Pharmacy'", Verghese publishing house, Bombay.
5.Gennaro, A.R., Remington's "The Science and practice of Pharmacy", Lippincot, Wiliams& Wilkins, Philadelphia.
6. Aulton, M.E.,"Pharmaceutics- The science of dosages form design", Churchill Livingstone, London.
7.N.K. Jain, Text Book of Professional Pharmacy, CBS Publishers & Distributers. New Delhi.
8.N.K. Jain Pharmaceutical product development, CBS Publishers & Distributors. New Delhi.
9.B.M. Mithal, Text Book of Pharmaceutical Formulation.
10. Loyd.V.Allen, Jr.Nicholas, G. Popovice, Howad. C. Ansel Pharmaceutical Dosage Forms & Drug Delivery System.
11.E.A. Rawlins. Textbook of Pharmaceutics, Bentley, E.A. Rawlins.
12. Ali .M. Dictionary of Pharmacy

# PHARMACEUTICAL CHEMISTRY I (Physical Chemistry)
# BPH 104

**1. Physico-chemical properties of substances:**

Polarity of Substances, dipole moment, dielectric constant, refraction index, optical rotation, density, specific gravity, viscosity, molar refraction, parachor relative permittivity, Bonding and non-bonding interaction, roentgen diffraction, polymorphism, isomorphism, isotropy, anisotropy, liquid crystals.

**2.Thermodynamics:**

**Fundamentals of thermodynamics**: System and surroundings, extensive and intensive properties, state functions, types of processes. Spontaneity of chemical change; Free Energy. Equilibrium; Enthalpy and Entropy and spontaneous change.

**First law of thermodynamics:** Concept of work, heat internal energy and enthalpy, standard state, thermo chemistry, thermo chemical laws, heat capacity, molar heat capacity, Hess's law of constant heat summation; Enthalpies of bond diffociation, combustion, formation, atomization, sublimation, phase transition, hydration, ionization and solution.

**Second law of thermodynamics:** Spontaneity of processes; $\Delta S$ of the universe and $\Delta G$ of the system as criteria for spontaneity, $\Delta Go$ (Standard Gibbs energy change) and equilibrium constant.

**Third Law of Thermodynamics:** calculation of absolute entropies; specific heat; variation in enthalpy with temperature.

Helmholtz and Gibbs energies, chemical potential, conception of absolute entropy.Calculations involving entropy and enthalpy; dealing with ions etc. Variation of $\Delta G$ and K with temperature: Ellingham Diagrams, Giauque Function.

**3. Chemical equilibrium**

Law of chemical equilibrium, Equilibrium constant, equilibrium degree of conversion and its control by reaction, conditions, Lech atelier principle, standard change of Gibbs energy during reaction, Equilibrium constant and their significance, factors affecting equilibrium concentration, pressure, temperature, effect of catalyst.

Acid-base catalysis, decomposition of medicinal compounds, accelerated stability analysis, kinetics of enzyme catalyzed reactions.

Integrated rate equations for simple reaction types.Use of integrated rate equations to determine order.

**4. Kinetics of more complex reactions:** approach to equilibrium, parallel and consecutive reactions. Rate determining step.Steady state approximation and its uses. Effect of temperature on rate and rate constant.Arrhenius equation, significance of activation energy.Kinetics of reactions in the gas phase - simple collision theory. Reactions in solution - transition state theory. Enthalpy and entropy of activation.Effects of solvent polarity and viscosity on rates of reaction.

Further applications of the steady state approximation - radical chain reactions.General definitions.Stoichiometry vs. mechanism. Dependence of rate on concentration: rate constant and order of reaction. Experimental determination of rates of reaction.Determination of orders from rate measurements.

**5. Phase equilibrium**

Gibb's phase rule, types of systems, one component equilibrium, Clapeyron and Clausius-Clapeyron equations, two component systems, Henry's law, sparingly miscible liquids, solubility of solid substances, system solid substance - solvent, melts, Raoult's law and its application, cryoscopy and ebullioscopy, osmotic pressure, three component systems, Nernst distribution law, extraction, ternary diagram, system of three liquids, interfacial phenomena, adsorption on solid surfaces. Phase diagram of mixture fractional distillation, eutectic mixtures.

**LIST OF PRACTICALS**

1. Determination of specific gravity of liquids using pycnometer and density bottle.
2. To study the effect of salt/Sugar in different concentration on density of water.
3. To study the effect of temperature on density of given liquid.
4. Determination of the viscosity of a liquid by Ostwald viscometer.
5. To study the effect of concentration on viscosity.
6. To study the effect of temperature on viscosity.
7. Determination of the percent composition of a mixture of ethanol and water by viscometric method.
8. Determination of the surface tension of liquid of a pure liquid by the capillary rise method.
9. To determine the surface tension of liquid using stalagmometer.
10. To study the effect of temperature on surface tension.
11. To study the effect of surfactant on surface tension.
12. Determination of the percentage composition of mixture of ethanol and water by surface tension method.
13. Determination of interfacial tension between benzene and water by the drop size method.
14. Determination of the parachor value of an organic liquid.
15. Determination of solubility of benzoic acid over a range of temperatures and calculation of its heat of solution.
16. Determination of the mutual solubility curve of phenol and water.
17. Preparation of buffer solutions and measurement of pH.
18. Determination of phase diagram in ternary system containing a single pair of sparingly miscible liquids.
19. Determination of distribution coefficient of substance between two immiscible liquids. (Succinic acid between ether and distilled water).

**Books Recommended:**

1. P .W. Atkins, The Elements of Physical Chemisrty.
2. P. W. Atkins, Physical Chemistry.
3. B .G. Cox, Modern Liquid Phase Kinetics, Oxford Science Publications.
4. J.R. Barrante: Physical Chemistry of Life Sciences, Printeil.
5.L.M. Atherden: Bentley and Driver's Textbook of Pharmaceutical Chemistry, Oxford University Press, Delhi.
6.H.H. Willard, L.L. Merritt and J.A. Dean: Instrumental Methods of Analysis, Van Nostrand Reinhold, New York.
7. Samuel Glasstone and David Lewis: Elements of Physical Chemistry, Macmiilan Press, London.
8. A.H. Beckett and J.B. Staenlake: Practical Pharmaceutical Chemistry, Vol. I and II. The Athlone Press of the University of London.
9. Martin A.N. Physical Pharmacy, Lea and Fibiger, Philadelphia.
10.Yadav J.B. Advanced Practical Physical Chemistry, Geol Publisher House, Meenet, India.
11.Vogel's Text Book of Quantitative Inorganic Analysis including Elementary Instrumental Analysis, Longman, London.
12. Bahl & Bahl, Essential of Physical Chemistry, S.Chand
13. Raj. G., Advance Physical Chemistry, Goel Publication.
14. Gaur & Gupta, Practical Physical Pharmacy, CBS Publication.
15. Singhai, Nayak & Paliwal, Pharma Chem(Physical) Sai Prakashan.
16. Yadav,J.B. Advance Practical Physical Chemistry,Goel Publication.
17. Bhaskaran, Physical Pharmaceutics Lab Manual,Birla Publication.

# Pharmaceutical Chemistry II - (Inorganic Chemistry)
# BPH 105

1. **Sources of impurities in pharmaceutical substances:** Importance of limit test and general principles and procedure for limit tests of chloride, sulphate, iron, arsenic, lead and heavy metals.
2. **Essential and Trace Elements:** Study the role of essential and trace elements in biological systems and their toxicity.
3. **Major Intra and extra cellular electrolytes:** Major physiological ions, electrolytes used in replacement therapy, physiological acids-base balance, electrolytes used in acid-base balance, electrolytes used in acid-base therapy, electrolyte combination therapy.
4. **Inorganic Agents :**
   preparation, physical characteristics, chemical properties, purity test, incompatibilities, assay and pharmaceutical uses of inorganic official compounds of the following elements:
   Aluminum, Sodium, Magnesium, Lithium, Calcium, Iron, Copper, Silver, Antimony, Iodine, Boron, Potassium, Zinc, Nitrogen.
   **Reagents:** Preparation, properties and uses of the following reagents: Nessler's reagents, boron trifluoride, Grignard reagent, Potassium permanganate, potassium dichromate, Hydrogen peroxide, Iodine solution.
5. **Radiopharmaceuticals:**
   Basic properties, production, quality control, stability, clinical and medicinal applications of radioisotopes used in pharmacy and medicinal preparations of diagnostic and therapeutic agents.

**LIST OF PRACTICALS**

1. Limit test for Lead.
2. Limit test for Arsenic.
3. Limit test for Chloride.
4. Limit test for Sulfate.
5. Limit test for Heavy metals.
6. Standardization of sulphuric acid.
7. Standardization of hydrochloric acid.
8. Standardization of sodium hydroxide.
9. Standardization of potassium permanganate.
10. Standardization of sodium thiosulphate.
11. Determination of strength of solution of ammonia.
12. Quantitative determination of boric acid.

13. Assay of sodium bicarbonate.
14. Assay of sodium carbonate.
15. Assay of ferrous sulphate.
16. Assay of iodine solutions.
17.Preparation of Alum (potassium and ammonium).
18. Preparation of Ferrous sulfate.
19. Preparation of dibasic calcium phosphate.
20. Preparation of ferric ammonium citrate.
21. Preparation of light and heavy magnesium oxide
22. Preparation of magnesium carbonate.
23. Preparation of calcium carbonate.
24. Preparation of magnesium trisilicate.
25. Preparation of zinc sulphate.
26. Preparation of Copper sulfate.

**Books Recommended**

1. L.M. Atherdon, Bently and Drivers: Textbook of pharmaceutical chemistry, Oxford, University press.
2. Pharmacopoeia of India, Govt. of India, Ministry of Health, Delhi.
3.J.H. Block, E. Roche, T.O. Soine and C.O. Wilson: Inorganic Medicinal and Pharmaceutical Chemistry, Lee Febiger, Philadelphia. PA.
4. Roger's Inorganic Pharmaceutical Chemistry , Lea and Febiger, Philadelphia, USA.
5. M. Ali: Text book of Pharmaceutical Inorganic chemistry, CBS, New Delhi.
6. Atkins P.W. Physical Chemistry, Oxford 1990.
7. Beckett &Stenlake, Practical Pharmaceutical Chemistry.
8. British Pharmacopoeia, Stationary Press, Royal Society of Pharmaceutical Press, London.
9. United State's Pharmacopoeia, United State Pharmacopoeial Convention, Inc., 12601. Twinbrook parkway, Rockyville M.D. 20852 USA.
10. Vogel's Text Book of Quantitative Chemical Analysis, Longman, London.
11.Remington's Practice of the Science and Pharmacy, Mack Publishing Company, Eston, Pennsylvania, USA.
12. Ali, M., T.B. of Pharma. Chem., CBS Publication.
13. Chowdhary & Gurbani, Pharma Chem.-I, Vallabh Prakashan.
14. Chatwal. G. R., Pharma. Chem. – Inorganic, Himalaya Pub House.
15. Singhai,Paliwal & Nayak, Pharma. Chem.-Inorganic, Sai Prakashan.
16. Belsore, Practical Inorganic Chem.
17. Rao. G. D., Practical inorganic Chem.

# Communication Skills
## BPH 106

C**ourse Objectives:** After getting the course the students should be able to:

- Know the process of communication and its components.
- Improve the language skills i.e. Listening Skills, Speaking Skills, Reading Skills and Writing Skills (LSRW).
- Enhance basic and intermediate skills in English language.
- Improve phonetic competence, comprehension skills, presentation skills, group discussion skills etc.
- And build confidence in communicating in English and create interest for life-long learning of the English language.

**Unit I: Basics of Communication:**

Definition and Process of communication, Kinesics, paralinguistics, proxemics, Verbal and Non verbal communication, Barriers in communication and how to overcome each one of them

**Unit II: Writing Skills**

Writing of definitions and descriptions of terms, Letter writing (applications, enquiry, quotations, tenders, order and complaints), Report writing, Noting and Drafting, email etiquette, Resume Writing etc.

**Unit III: Reading Skills**

Reading Comprehension exercises pertaining to medical subjects and topics of general interest from daily life and from workplace, skimming and scanning (Min. 5 to be selected by the instructor)

**Unit IV: Listening Skills**

Process and Principles of listening, Importance types and barriers, listening for meaning, Listening techniques and activities, developing effective listening skills

**Unit V Speaking Skills (Oral Communication skills)**

Basics of English Phonetics and phonology( IPA symbols and their practice ), Difference between the sounds of English and the Hindi speech pattern, Oral presentations ( Conversation practice through role play, telephone, media, socializing, cultural events, debates, extempore speech, Group discussion etc. )

**Communication Skills: Practice**

**Course Objective:** The main thrust will be on the production and practice of sounds of English through audio – visual aids and computer software. The instructor will monitor each student separately to enable him/ her to speak English correctly and confidently. Between the fluency and the accuracy, the later will be aimed at first to let the students overcome their inhibitions and fear while speaking English.

The following topics will be covered in the language laboratory sessions:

1. Phonetic symbols and their pronunciation ( The difference between English and Hindi sound patterns )
2. LSRW skills and their practice
3. Body language and practice
4. Oral presentations with the help of PPT
5. Basic Grammar and vocabulary ( synonyms, antonyms, homonyms, sentence completion exercises, idioms, proverbs, phrases) Common errors and mistakes in English

**Final assessment will be based on regular assignments, presentation, oral quiz, interactive sessions and written examination**

**Reference Books:**

1. Kumar S and Lata P Communication Skills (2011): New Delhi Oxford University Press
2. Leech, Geoffrey and Jan Svartvik. (2009). A Communicative Grammar of English. New Delhi: Pearson
3. Lesikar R V, Flatley M E ,Rentz K and Pandey(2009): Business Communication: Making Connections in a Digital World New Delhi, Tata McGraw Hill
4. Sadanand Kamlesh and Punitha Sushila (2014) Spoken English: A foundation Course. Hyderabad , Oreint BlackSwan