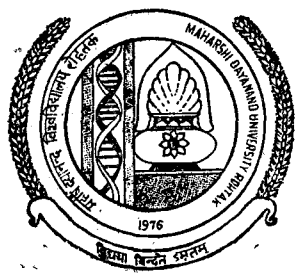


Maharshi Dayanand University Rohtak



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Syllabus and Courses of Reading for B.Pharmacy Part-I Examination Session—1999-2000

Available from :

Deputy Registrar (Publication)
Maharshi Dayanand University
Rohtak-124 001 (Haryana)

Price :

At the Counter : Rs. 50/-
By Regd. Parcel : Rs. 75/-
By Ordinary Post : Rs. 60/-

ORDINANCE : BACHELOR OF PHARMACY

1. The duration of the course of instruction for the degree of Bachelor of Pharmacy shall be four years.
2. A person who shall attain the age of 17 years or more on December 31 of the year of admission and must have passed the following examination shall be eligible to join the first year of Bachelor of Pharmacy Course.

Senior Secondary Examination (10+2) of the Board of School Education Haryana, Bhiwani OR an examination recognised as equivalent thereto by Maharshi Dayanand University, Rohtak with atleast 33% marks in each subject i.e. English, Physics, Chemistry and Biology (Botany and Zoology) in theory and practical separately and 50 % marks in aggregate of these subjects.

3. The examination shall be held in four parts, viz. Part-I at the end of the course of 1st year, Part-II at the end of second year, Part-III at the end of third year and Part-IV at the end of the fourth year.
4. The examination in each part shall ordinarily be held in the month of April or on such other dates as may be fixed by the Vice-Chancellor.
5. A supplementary examination shall be held ordinarily in the month of August/September or on such dates as may be fixed by the Vice-Chancellor for the students who have failed in one or more subject(s) or having been eligible failed to appear in the annual examination.
6. A candidate who has secured atleast 50% marks in the aggregate but has secured less than 50% marks in not more than two subjects (separtely in theory & practical) may be promoted to the next higher class and be permitted to appear at the examination in that subject of the previous year alongwith the examination of the year to which thus promoted. However, for promotion from Part-II to Part-III and Part-III to Part-IV a student shall be required to clear all the subjects of Part-I and Part-II of the course respectively.

7. A candidate who fails to pass or fails to qualify for

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PHARMACEUTICAL CHEMISTRY-I
(Pharmaceutical Organic Chemistry)

Theory**1 Structure and Properties**

Atomic structure; Atomic Orbitals, Molecular Orbital theory wave equations, Molecular Orbital; Bonding & anti-bonding orbitals, Electronic configuration of some molecules; covalent bond; Hybrid orbitals; Intramolecular forces; Bond-dissociation energy, polarity of bonds; polarity of molecules; structure & physical properties; Intermolecular forces; Acids & Bases, Isomerism.

2. Stereochemistry

Introduction, Optical activity, stereoisomerism, specifications of configuration; Reactions involving stereoisomers.

3. Structure, Nomenclature, preparation & Reactions of Alkanes; Alkenes; Alkynes; Cycloalkanes; Dienes; Benzene; Polynuclear, Aromatic compounds; Arenes; Alkyl Halides; Alcohols; Ethers Epoxides; Amines; Phenols; Aldehydes & ketones; Carboxylic acids; functional derivatives of carboxylic acids; carbanions; Aldol condensation; claisen condensation; malonic esters & Acetoacetic ester synthesis.

4. Nucleophilic aromatic substitutions; unsaturated carbonyl compounds.

Electro cyclic reactions, sigmatropic reactions, Neighbouring gp. effects, Catalysis by transition metal Complexes; Stereoselective & Stereospecific reactions; New Organic reagents used in drug synthesis.

Practicals

1. Synthesis of selected organic compounds.
2. Identification of organic compounds and their derivatisations.
3. Introduction to the use of streamodels.

Determinants and their six important properties, solutions of simultaneous equations by Cramer's rule. Matrices, definitions of special matrices (like unit, singular, diagonal matrices etc.), arithmetic operations on matrices; transpose, adjoint, reciprocal and inverse of a matrix, solution of simultaneous equations using matrices. Partial fractions and resolution of linear and quadratic (non-repeated) partial fractions. Evaluation of E_n , E_n^2 and E_n^3 Pharmaceutical applications of mensuration.

2. Trigonometry

Revision on angle measurement and T-ratios, Addition, Subtraction and transformation formulae. T-ratios of multiple sub-multiple and allied angles, solution of simple trigonometric identities based on above concepts. Pharmaceutical application of logarithms.

3. Analytical Plane Geometry

Cartesian co-ordinates, distance between two points, area of triangle, locus of a point, straight line, slope and intercept form, double intercept form, general equation of first degree.

4. Calculus

A. Differential

Limits and functions, differential coefficient, differentiation of standard functions, including function of a function (chain rule), differentiation of implicit functions, logarithmic differentiation, parametric differentiation, elements of successive differentiation.

B. Integral

Integration as inverse of differentiation, indefinite integrals of standard forms, integration by parts, by partial fractions and by substitution, formal evaluation of definite integrals.

5. Differential equations :

Definition and formation of ordinary differential equations; equation of first order and first degree, variable separable, homogeneous equations, linear equations (Liebnitz form) and differential equations reducible to these types. Linear differential equations of order greater than one with constant

coefficients, complementary function and particular integrals of e^x , x^m , $\sin(ax+b)$ or $\cos(ax+b)$ type of functions, solution of simple simultaneous linear differential equations. **Pharmaceutical Transforms.**

6. Laplace Transforms

Definition, properties of linearity and shifting, transforms of elementary functions (without proof) and inverse laplace transforms not involving Euler's theorem, transforms of derivatives. Solution of ordinary and simultaneous differential equations.

7. Pharmaceutical Statistics

The concepts, mathematical computations (wherever applicable) and pharmaceutical applications (wherever possible) on :

7.1 Significant digits and rounding of numbers, collection of primary and secondary data through experiments or surveys sampling and complete enumeration survey, merits and limitations of various random and non-random sampling methods, data organization including frequency distributions and tabulation, diagrammatic representation of data, simple, multiple, sub-divided and floating bar diagrams, pie diagrams, 2-D and 3-D pictographic representation, graphs of frequency distributions.

7.2 Measures of central tendency, ideal characteristics, mean, median, Mode, GM, HM and weighted arithmetic mean from discrete and continuous frequency distributions, quartiles, deciles and percentiles, measures of dispersion, range, quartile deviation, mean deviation, standard deviation, calculation of standard deviation from discrete and continuous frequency distributions, standard error of means, coefficient of variation.

7.3 Probability and events, Bayes theorem, probability theorems, probability distributions, elements of binomial and Poisson distributions, normal distribution, normal distribution curve and properties, calculation of areas under normal curve and standard normal variate (Z statistic), confidence limits, deviations forms normality, Kurtosis and skewness, elements of central limit theorem.

- 7.4 Linear correlation and regression analysis, scatter plots, method of least squares, Pearsonian coefficients of correlation and determination, definitions, of amount of explained variance, standard error of estimate and significance of regression (F).
- 7.5 Statistical inference, Type I and II errors, t-test (paired and unpaired).
- 7. Study of fibres and pharmaceutical aids.
- 8. Microscopic studies of crude drugs and their powders underlined in the category of volatile oils and their chemical tests.
- 9. General chemical tests for alkaloids, glycosides, steroids, flavonoids and tannins.

PHARMACOGNOSY-I

Theory

- 1. Definition, history, scope and development of Pharmacognosy.
- 2. Sources of drugs : Biological, marine, geographical and plant tissue cultures as sources of drugs.
- 3. Classification of drugs : e. g. Alphabetical, morphological, taxonomical pharmacological and chemical.
- 4. Plant taxonomy : Study of following families with special reference to medicinally important plants—Apocynaceae, Solanaceae, Rutaceae, Umbelliferae, Leguminosae, Rubiaceae, Liliaceae, Graminae, Labiate, Cruciferae, Papaveraceae.
- 5. Cultivation, collection, processing and storage of crude drugs : Factors influencing cultivation of medicinal plants. Types of soils and fertilizers of common use. Pest management and natural pest control agents, Plant hormones and their applications. Polyploidy, mutation & hybridization with reference to medicinal plants.
- 6. Quality control of crude drugs : Adultration of crude drugs and their detection by organoleptic, microscopic, physical, chemical and biological methods of evaluation.
- 7. An introduction to active constituents of drugs : Their isolation, classification and properties.

8. Systematic pharmacognostic study of following :

- a) Carbohydrates and derived products : Agar, Guar, Gum, Gum acacia, Honey, Isabgol, Pectin, Strarch, Sterculia & Tragacanth.
 - b) Lipids : Bees wax, Castoroil, Cocoa butter, Cod-liver oil, Hydnocarpus oil, Kokum butter, Lard, Linseed oil, Rice bran oil, shark liver oil and wool fat.
9. Study of drugs containing resins and resin combinations : Colophony, Podophyllum, Jalap, Cannabis, Capsicum, Myrrh Afasoetida, Balsam of Tolu, Balsam of peru, Benzoin, Turmeric, Ginger.
10. Volatile Oils : General methods of obtaining volatile oils from plants, study of volatile oils of Mentha, Coriander, Cinnamon, Cassia, Lemon peel, Orange peel, Lemon grass, Citronella, Caraway, Cumin, Dill, Spearmint, Clove, Fennel, Nutmeg, Eucalptus, Chenopodium, Cardamom, Valerian, Musk, Palmarosa, Gaultheria, sandal wood.
11. Study of pharmaceutical aids like talc, diatomite, kaolin, bentonite, gelatin and natural colours.

Practical – No. of experiments based on above mentioned theory portion and including the following :—

1. Morphological characteristics of plant families mentioned in theory.
2. Microscopic measurements of cells and cell contents : Starch grains, calcium oxalate crystals and phloem fibers.
3. Determination of leaf constants such as stomatal index, stomatal number, vein islet number, vein termination number and palisade ratio.
4. Identification of crude drugs belonging to carbohydrates and lipids.
5. Preparation of herbarium sheets.
6. Identification of crude drugs mentioned in theory.

Pharmaceutical Chemistry-II

(PHARMACEUTICAL INORGANIC CHEMISTRY)

Theory

An outline of methods of preparation, uses, sources of impurities, tests for purity and identity, including limit tests for

iron, arsenic, lead, heavy metals, chloride, sulphate and special tests if any, of the following classes of inorganic pharmaceuticals included in Indian Pharmacopoeia monograph details.

1. Acids and Bases : Buffers, Water.
2. Gastrointestinal agents : Acidifying agents. Antacids, protectives and adsorbent, Cathartics.
3. Major extra and intra-cellular electrolytes : physiological ions
Electrolytes used for replacement therapy, acid-base balance and combination therapy.
4. Essential and trace elements : Transition elements and their compounds of pharmaceutical importance : Iron and haematinics, Mineral supplements.
5. Cationic and anionic components of inorganic drugs useful for systemic effects.
6. Topical agents : Protectives, Astringents and Anti-infectives.
7. Gases and Vapourous : Oxygen : Anaesthetics and Respiratory stimulants.
8. Dental products : Dentrifrices, anti-caries agents.
9. Complexing and chelating agents used in therapy.
10. Miscellaneous agents : Sclerosing agents, expectorants, emetics, poisons and antidotes sedatives etc.
Pharmaceutical Aids used in Pharmaceutical Industry. Antioxidants, preservatives, filter aids, adsorbents, diluents, excipients, suspending agents, colorants etc.
Inorganic Radiopharmaceuticals : Nuclear radio pharmaceuticals, reactions, Nomenclature, Methods of obtaining their standards and Units of activity, measurement of activity clinical applications and Dosage, Hazards & precautions.

PRACTICALS :

The background and systematic qualitative analysis of inorganic mixtures of up to 4 radicals. Six Mixtures to be analyzed, preferably by semi-micro methods.

All identification tests for pharmaceutical inorganic pharmaceuticals and qualitative tests for cations & anions as included in the Appendix of IP should be carried out.

PHARMACEUTICS-I
(Dispensing and Hospital Pharmacy)

Theory

Pharmaceutical Dispensing

1. Definitions and general dispensing procedure.
2. Sources of information required for pharmacists.
3. Types of dispensing products.
4. Containers, closures and labelling for dispensed products.
5. Sources of errors and care required in dispensing prescriptions.
6. Principles involved and procedures adopted in dispensing of :
typical preparations like mixtures, solutions, emulsion, creams, ointments, powders, pastes jellies, suppositories, ophthalmics, pastilles, lozenges, pills, lotions, liniments, inhalations, paints sprays etc.
7. Incompatibilities—physical and chemical, occurrence and methods adopted in corrections.
8. Colours, flavours, sweeteners and other additives used in prescriptions.
9. Pharmaceutical Latin-Latin terms used in prescriptions and their English equivalents.
10. Pharmaceutical Calculations— calculation of doses, enlarging and reducing recipes, percentage solutions, alligation, alcohol dilutions, proof spirit, isotonic solutions, displacement value, etc.
11. Hospital and its organisation.
 - (a) Pharmacy, organisation and personnel.
 - (b) Hospital formulary,
 - (c) Purchasing and inventory control.
 - (d) Drug distribution.
 - (e) Dispensing to in-patients.
 - (f) Dispensing to out-patients.
 - (g) Dispensing of controlled drugs.
 - (h) Drug charges:
 - (i) Prepackaging.
 - (j) Central sterile supply.

- (k) Drug information centre.
- (l) Maintenance of records.
- (m) Safe use of medicines.
- (n) Professional practices.

Practical : Number of experiments based upon aforementioned theory portion but including dispensing of preparation like : Emulsion. Suspension, solutions, cream, ointments, inhalations, liniments, paints, syrups, mixtures, paste etc.

PHARMACEUTICS-II

(General Pharmacy)

Theory

1. **Extraction** Various methods of extraction of crude drugs namely percolation (various types including processes for concentrated preparation, constant hot percolation), maceration (various types including processes for organised and unorganised drugs, for concentrated preparations, double and triple maceration processes), Decetion.
Various extractives namely infusions, tinctures, soft and dry extracts, oleoresins.
2. **Liquid Preparations :** Formulation. preparation and uses of various liquid products namely syrups, aromatic waters, spirits, solutions, mucilages, elixers, glycerin, mouth washes, gargles, Nasal drops, Ear drops.
3. **Glandular products :** Introduction, extraction methods, and their preparation of thyroid, Pancrease, liver, Pituitary gland
4. **Immunology :** General introduction, infection, factors influencing infections, kinds of immunity, vaccines (i.e. Tetanus vaccines, Diphtheria, vaccine, BCG vaccine, small pox vaccine), virus immunity, ioxoids, Toxins, Diagnostic preparation, Sera, Antitoxins (i.e. Diphtheria antitoxins, Botulinum antitoxins), brief control of immunological products-identification tests, toxicity test, sterility test, potency tests, and storage of immunological product.
5. **Blood and related products :** Whole Human Blood, concentrated Human RBC, Dried Human plasma, Dried Human serum, Human plasma protein fraction, Human fibrinogen, human thrombin, plasma substitute, ideal plasma substitute

properties, products i.e. PVP, Dextran, absorbable gelatin, sponge, oxidised cellulose, calcium gluconate.

6. Surgical dressings like fibres, fabrics, bandages, surgical ligatures and sutures i.e. catgut, and other absorbable & non absorbable products.
7. Semisolid dosage forms (ointments and suppositories): ointment ointment bases, factors governing selection of ideal base, preparation of ointments.
Suppositories-suppository bases, selection of ideal base, preparation of suppositories.

Practicals: Number of experiments based upon aforementioned theory portion and including preparation of the following :--

1. Peppermint water
2. Cinnamon water
3. Camphor water
4. Chloroform water
5. Concentrated peppermint water
6. Concentrated cinnamon water
7. Simple syrup
8. Syrup of Ginger
9. Syrup of Orange
10. Syrup of Tolu
11. Compound syrup of ferrous phosphate
12. Spirit of peppermint
13. Spirit of chloroform
14. Spirit of ether
15. Strong solution of ammonium acetate
16. Surgical solution of chlorinated soda
17. Solution of cresol with soap
18. Solution of ferric chloride
19. Strong solution of iodine.
20. Solution of Hydrogen peroxide.
21. Tannic acid glycerin
22. Boric acid glycerin
23. Mouth washes
24. Gargles
25. Nasal drops
26. Ear drops.

27. Elixers
28. Mucilage of acacia
29. Mucilage of tragacanth
30. Tincture of orange
31. Capsicum Tincture
32. Strong tincture of ginger
33. Tincture of lemon
34. Tincture of tolu
35. Tincture of nux Vomica
36. Liquid extract of Liquorice
37. Liquid extract of ipecacuanha
38. Liquid extract of belladonna
39. Liquid extract of senna
40. Concentrated infusion of clove
41. Concentrated infusion of quassia
42. Concentrated infusion of senna.
43. Liver extract

PHARMACOLOGY-I

(Anatomy Physiology & Health Education).

Theory

1. Scope of anatomy and physiology and basic terminology used in these subjects.
2. Structure of cell, its components and their functions.
3. Elementary tissues of the human body: Epithelial, connective, muscular and nervous tissues, their sub-types and characteristics.
4. Osseous system : Structure, composition and functions of skeleton, Classification of joints, types of movements at joints, Disorders of joints.
5. Skeletal muscles : Their gross anatomy; physiology of muscle contraction, physiological properties of skeletal muscles and their disorders.
6. Haemopoietic system : Composition and functions of blood and its elements their disorders, blood groups and their significance, mechanism of coagulation; disorders of platelets and coagulation.

7. **Lymph and Lymphatic system :** Composition, formulation and circulation of lymph; disorders of lymph and lymphatic system. Basic physiology and functions of spleen.
8. **Cardiovascular system :** Basic anatomy of the heart, Physiology of heart, blood vessels and circulation. Basic understanding of Cardiac cycle, heart sounds and electrocardiogram. Blood pressure and its regulation. Brief outline of cardiovascular disorders like hypertension, hypotension, arteriosclerosis, angina, myocardial infarction, congestive heart failure and cardiac arrhythmias.
9. **Digestive System :** Gross anatomy of the gastro-intestinal tract, functions of its different parts including those of liver, pancreas and gall bladder, various gastrointestinal secretions and their role in the absorption and digestion of food. Disorders of digestive system.
10. **Respiratory System:** Anatomy of respiratory organs, functions of respiration mechanism and regulation of respiration, respiratory volumes and vital capacity.
11. **Central Nervous System :** Functions of different parts of brain and spinal cord. Neurohumoral transmission in the central nervous system, reflex action, electroencephalogram, specialized functions of the brain, Cranial nerves and their functions.
12. **Autonomic Nervous System :** Physiology and functions of the autonomic nervous system. Mechanism of neurohumoral transmission in the A.N.S.
13. **Urinary System :** Various parts, structures and functions of the kidney and urinary tract. Physiology of urine formation and acid base balance. Diseases of the urinary system.
14. **Reproductive System :** Male and female reproductive systems and their hormones, physiology of menstruation, coitus and fertilization. Sex differentiation, spermatogenesis & oogenesis. Pregnancy its maintenance and parturition.
15. **Endocrine System :** Basic anatomy and physiology of Pituitary, Thyroid Parathyroid, Adrenals, Pancreas, Testes and ovary their hormones and functions.
16. **Sense Organs ;** Basic anatomy and physiology of the eye (vision), ear (Hearing) taste buds, nose (smell) and skin (superficial receptors).

17. Health Education :

- a) Concepts of health & disease, disease causing agents and prevention of disease.
- b) Classification of food requirements, balanced diet, nutritional deficiency disorders, their treatment and prevention, specifications for drinking water.
- c) Demography and family planning :
Demography cycle, family planning, various contraceptive methods. Medical termination of pregnancy.
- d) Brief outline of communicable diseases, their causative agents modes of transmission and prevention (chicken pox, measles, influenza, diphtheria, whooping cough, tuberculosis, poliomyelitis, hepatitis, cholera, typhoid, food poisoning, helminthiasis, malaria, filariasis rabies, trachoma, tetanus, Leprosy, syphilis, gonorrhoea, and AIDS).
- e) First Aid : Emergency treatment of shock, snake bites, burns, poisoning, fractures and resuscitation methods.

Practical :

1. Study of human skeleton.
2. Study of different systems with the help of charts and models.
3. Microscopic study of different tissues.
4. Estimation of hemoglobin in blood. Determination of bleeding time. clotting time, R.B.C. Count, T.L.C., D.L.C. and E.S.R.
5. Recording of body temperature, pulse rate and blood pressure, basic understanding of Electrocardiogram-PQRST waves and their significance.
6. Study of different systems with the help of charts and models.
7. Microscopic studies of different tissues.
8. Simple experiments involved in the analysis of normal and abnormal urine : Collection of specimen, appearance, determination of PH, Sugar, proteins, urea and creatinine.
9. Physiological experiments on nerve-muscle preparations.
10. Determination of vital capacity, experiments on spirometry.