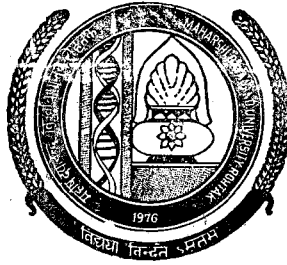


Maharshi Dayanand University Rohtak



Ordinances, Syllabus and Courses of Reading for B.. Pharmacy Part-I Examination

Session—2002-2003

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 has passed the following examination shall be eligible to join the first year of Bachelor of Pharmacy Course.

The candidate must have passed:-

- i) Senior Secondary (10 + 2) Examination of Board of School Education, Haryana, Bhiwani or an equivalent examination recognised by this University with atleast 50% in aggregate (pass marks for SC/ST) of Physics, Chemistry and Biology or Mathematics:

OR

- ii) Diploma in Pharmacy (D. Pharma) with atleast 50% marks in aggregate.
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(separately 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

(iv)

- i) candidates who pass all the four parts of examination obtaining 75% or more marks of the total aggregate shall be declared to have passed with distinction.
 - ii) those who obtain 60% or more of the aggregate number of marks in all the subject in Part-I, Part-II, Part-III & Part-IV examination taken together shall be placed in first division.
 - iii) those who obtain 50% or more but less than 60% marks in all subjects in Part-I, Part-II, Part-III & Part-IV examination taken together shall be placed in second division.
16. There will no improvement facilities to Bachelor of Pharmacy students. However, the grace marks will be allowed as per University rules.
17. The students admitted to B.Pharmacy Part-I during Academic Session 1995-96 will be following old syllabus-termed as B.Pharmacy (old scheme) whereas the students admitted during academic Session 1996-97 and afterwards will be following a revised syllabus-termed as B. Pharmacy (New Scheme). The students (admitted to B.Pharmacy-I during 1995-96), if any, detailed during 1995-96 owing to shortage of attendance will also be required to follow syllabi of B. Pharma. (New Scheme).
18. This ordinance also supercedes the earlier ordinance of 'Bachelor of Pharmacy' passed during 130th meeting of Executive Council. Accordingly, various classes of new ordinance will henceforth be applicable to all the students admitted during 1995-96 except in case of syllabi.
19. Notwithstanding the integrated nature of the Bachelor of Pharmacy course which is spread over more than one academic year, the Ordinance in force at the time a student joins course shall hold good only for the examination(s) held during or at the end of the academic year and nothing in these Ordinances shall be deemed to debar the University from amending the Ordinance subsequently and the amended Ordinance, if any, shall apply to all students whether old or new.

B.Pharmacy Part-I (RS) 2002-2003

Courses of study for B. Pharmacy Part-I (Revised Scheme)

Sr. No.	Subject to be taught	Teaching Load Theory Lectures (hours/week)	Teaching Load Practical (hours/week)
1.	Pharmaceutical Chemistry-I (Pharmaceutical Organic Chemistry)	03	03
2.	Pharmaceutical Mathematics	03	...
3.	Pharmacognosy-I	02	03
4.	Pharmaceutical Chemistry-II (Pharmaceutical Inorganic Chemistry)	02	03
5.	Pharmaceutics-I (Dispensing & Hospital Pharmacy)	02	03
6.	Pharmaceutics-II (General Pharmacy)	02	03
7.	Pharmacology-I (Anatomy, Physiology & Health Education)	03	03
8.	Remedial Biology (For Candidates having only Maths at 10 + 2 level)	02	02
	Total	19	23

Examination of B.Pharmacy Part-I (RS) 2002-2003

Sr. No.	Subject to be taught	Total marks for Theory examination including sessional	Total marks for Practical exam. including sessional
1.	Pharmaceutical Chemistry-I (Pharmaceutical Organic Chemistry)	100	100
2.	Pharmaceutical Mathematics	100	...
3.	Pharmacognosy-I	100	100
4.	Pharmaceutical Chemistry-II (Pharmaceutical Inorganic Chemistry)	100	100
5.	Pharmaceutics-I (Dispensing & Hospital Pharmacy)	100	100
6.	Pharmaceutics-II (General Pharmacy)	100	100
7.	Pharmacology-I (Anatomy, Physiology & Health Education)	100	100
8.	Remedial Biology (For Candidates who have not Biology at 10+2 level)	100	100
	Total 800 700

Scheme for Examination for B.Pharmacy Part-I (RS) 2002-2003

Sr. No.	Subject	Duration of examination		Theory & Practical Max. Marks	
		Theory	Practical	Annual	Sessional
1.	Pharmaceutical Chemistry-I (Pharmaceutical Organic Chemistry)	03	03	80	20
2.	Pharmaceutical Mathematics	03	...	80	20
3.	Pharmacognosy-I	03	03	80	20
4.	Pharmaceutical Chemistry-II (Pharmaceutical Inorganic Chemistry)	03	03	80	20
5.	Pharmaceutics-I (Dispensing & Hospital Pharmacy)	03	04	80	20
6.	Pharmaceutics-II (General Pharmacy)	03	04	80	20
7.	Pharmacology-I (Anatomy, Physiology & Health Education)	03	04	80	20
8.	Remedial Biology (For Candidates who have not studied Biology at 10+2 level)	03	03	80	20

PHARMACEUTICAL CHEMISTRY-I
(Pharmaceutical Organic Chemistry)

THEORY

Section - A

1. Structure and Properties: Atomic Structure: atomic orbitals, molecular orbital theory, wave equations, molecular orbital, bonding and anti-bonding orbitals, electronic configuration of some molecules, covalent bonds, hybrid orbitals, intermolecular forces, bond dissociation energy, polarity of bonds, polarity of molecules, structural and physical properties, intermolecular forces, acids and bases, isomerism.

2. Stereochemistry: introductory, optical activity, stereoisomerism, and specifications of configuration, reactions involving stereoisomers.

Section - B

3. Structure, Nomenclature, preparation and reactions of alkanes, alkenes, alkynes, cycloalkanes, dienes, benzene, polynuclear aromatic compounds, arenes, alkyl halides, alcohols, ether epoxides, amines, phenols, aldehydes and ketones, carboxylic acids, functional derivatives of carboxylic acid, carbanions, aldol condensation, Claisen condensation, malonic esters and acetoacetic ester synthesis.
4. Nucleophilic aromatic substitutions, unsaturated carbonyl compounds, Electro cyclic reactions, sigmatropic reactions, neighboring group effects. Catalysis by transition metal complexes, Stereoselective and Stereospecific reactions. New organic reagents used drug synthesis.

PRACTICALS

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

PHARMACEUTICAL MATHEMATICS

Section - A

1. Algebra: revision on equation reducible to quadratics and simultaneous equations (linear and quadratic) up to two variables only. Determinants and their six important properties, solutions of simultaneous equations by Cramer's rule. Matrices, definition 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 functions. 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-ratio

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, general equation of first degree.

Section - B

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, equations 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 $\cos(ax + b)$ types of functions, solution of simple simultaneous linear differential equations. Pharmaceutical transforms.
6. Laplace transforms: definition, properties of linearity and shifting, transforms of elementary function (without proof) and inverse laplace transforms not involving Euler's theorem, transforms of derivatives, solutions of ordinary and simultaneous differential equations.

Section - C

7. Pharmaceutical statistics: concept, 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 theorem, probability distributions, elements of binomial and Poisson distributions, normal distribution, normal distribution curve, and properties, calculation of areas under normal curve and standard normal curve (Z statistic), confidence limits, deviations from 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).

PHARMACOGNOSY - I

THEORY

Section - A

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: alphabetical, morphological, taxonomical, pharmacological, chemical and others with their merits and demerits.
4. Plant taxonomy: study of the following families with special reference to medicinally important plants-Apocynaceae, Solonaceae, 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 and hybridization with reference to medicinal plants.
6. Quality control of crude drugs: Adulteration of crude drugs and their detection by organoleptic, microscopic, physical, chemical and biological methods of evaluation.

Section - B

7. An introduction to active constituents of drugs: their isolation, classification and properties.
8. Systematic pharmacognostic study of the following:
 - a) Carbohydrates and derived products: Agar, Guar gum, Gum acacia, Honey, Isabgol, Pectin, Starch, Sterculia and Tragacanth,
 - b) Lipids: Bees wax, castor oil, 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, Asafoetida, 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, Eucalyptus, Chenopodium, Cardamom, Valerian, Musk, Palmarosa, Gaultheria, sandal wood.

11. Study of pharmaceutical aids like talc, diatomite, kaolin, bentonite, gelatin, and natural colorants.

PRACTICALS

Number of practicals based on aforementioned theory portion and including the following.

1. Morphological characteristic of plant families mentioned in the theory.
2. Microscopic measurements of cells and cell contents: starch grains, calcium oxalate crystals and phloem fibres.
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 mentioned in theory.

PHARMACEUTICAL CHEMISTRY-II **(Pharmaceutical Inorganic Chemistry)**

THEORY

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

Section - A

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 compounds of inorganic drug useful for systemic effects.
6. Topical agents: protectives, astringents and anti-infectives.

Section - B

7. Gases and vapours: oxygen, anesthetics and respiratory stimulants.
8. Dental products: dentrifices, anti-carries agent.
9. Complexing and chelating agents used in therapy.
10. Miscellaneous agents: sclerosing agents, expectorants, emetics, poisons and antidotes sedatives etc.
11. Pharmaceutical aids used in pharmaceutical industry. Antioxidants, preservatives, filter aids, adsorbents, diluents, excipients, suspending agents, colorants etc.
12. Inorganic Radiopharmaceuticals: nuclear Radiopharmaceuticals, reactions, nomenclature, methods of obtaining their standards and units of activity, measurement of activity, clinical applications and dosage, hazards and precautions.

PRACTICALS

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

All identification test for pharmaceutical, inorganic pharmaceutical and qualitative tests for cations and anions as included in the appendix of IP should be carried out .

PHARMACEUTICS - I

(Dispensing and Hospital Pharmacy)

THEORY

Pharmaceutical Dispensing

Section - A

1. Definitions and General Dispensing Procedures.
2. Sources of information required for Pharmacists.
3. Types of Dispensed products.

4. Containers, closures and labelling for dispensed products.
5. Sources of error 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.

Section - B

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.

Section - C

11. Hospital and its organisation
 - a) Pharmacy, organisation and personnel
 - b) Hospital formulary
 - c) Purchasing and inventory control
 - d) Drug distribution
 - e) Dispensing to inpatients
 - f) Dispensing to outpatients
 - 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 practicals based on aforementioned theory portion but including dispensing of preparations like emulsions, suspensions, solutions, creams, ointments, inhalations, liniments, paints, syrups, mixtures, pastes etc.

PHARMACEUTICS - II

(General Pharmacy)

THEORY

Section - A

1. Extraction: Various methods of extraction of crude drugs namely percolation (various types including processes for concentrated preparations, constant hot percolation), maceration (Various types, including processes for organised and unorganised drugs, for concentrated preparations, double and triple maceration processes), Decoction.
2. Liquid Preparations: Formulation, preparation and uses of various liquid products, namely syrups, aromatic waters, spirits, solutions, mucilages, elixirs, glycerins, mouthwashes, gargles, nasal drops, ear drops.
3. Immunology: General introduction, infection, factors influencing infection, kinds of immunity, vaccines (i.e. Tetanus vaccine, Diphtheria vaccine, BCG vaccine, small pox vaccine), virus immunity, toxoids, toxins, diagnostic preparation, sera, antitoxins (i.e. Diphtheria antitoxins, Botulinium antitoxins), brief control of immunological products-identification tests, toxicity tests, sterility tests, potency tests and storage of immunological products.

Section - B

4. Glandular Products: Introduction, extraction methods and preparation of thyroid, liver, pancreas and pituitary gland.

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

PRACTICALS

Number of practicals based on aforementioned theory portion and including preparation of the following:-

Peppermint water, cinnamon water, camphor water, chloroform water, concentrated peppermint water, concentrated cinnamon water, simple syrup, syrup of ginger, syrup of orange, syrup of tolu, compound syrup of ferrous sulphate, spirit of peppermint, spirit of chloroform, spirit of ether, strong solution of ammonium acetate, surgical solution of chlorinated soda, solution of cresol with soap, solution of ferric chloride, strong solution of iodine, solution of hydrogen peroxide, tannic acid glycerin, boric acid glycerin, mouth washes, nasal drops, ear drops, elixirs, mucilage of acacia, mucilage of tragacanth, tincture of orange, capsicum tincture, strong tincture of ginger, tincture of lemon, tincture of tolu, tincture of nuxvomica, liquid extract of liquorice, liquid extract of ipecacuanha, liquid extract of belladonna, liquid extract of senna, concentrated infusion of clove, concentrated infusion of quassia, concentrated infusion of senna, liver extract.

PHARMACOLOGY - I**(Anatomy, Physiology and health Education)****THEORY****Section - B**

1. Scope of Anatomy, Physiology and basic terminology used in these subjects.
2. Structure of cell, its components and their function.
3. Elementary tissues of the human body: Epithelial, connective, muscular and nervous tissue, their sub-type 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. Haemopoetic 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.

Section - B

9. Digestive system: Gross anatomy of the gastrointestinal tract, function 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 Autonomic Nervous system.
13. Urinary system: Various parts, structures and function of the kidney and urinary tract. Physiology of urine formation and acid base balance. Diseases of 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 (smell) and skin (superficial receptors).

Section - C

17. Health Education:
 - a) Concepts of health & disease, disease causing agents and prevention of disease.
 - b) Classification of food requirements, balance diet, nutritional deficiency disorders, 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.

PRACTICALS

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 wave 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. Determinations of vital capacity, experiments on spirometry.

REMEDIAL BIOLOGY

THEORY

1. Methods of classification of plants.
2. Plant cell: its structure and non-living inclusions, mitosis and meiosis, different types of plant tissues and their functions.

3. Morphology and histology of root, stem, bark, wood, leaf, flower, fruit, and seed. Modification of root and stem.
4. General survey of animal kingdom, structure and life history of parasites as illustrated by amoeba, trypanosoma, plasmodium, taenia, ascaris.
5. General structure and life history of insects like mosquito, houseflies and silkworm.

PRACTICALS

1. Morphology of plant parts indicated in theory.
2. Care, use and type of microscope.
3. Gross identification of slides of structure and life cycle of lower plants/animal mentioned in theory.
4. Morphology of plant parts indicated in theory.
5. Preparation, microscopic examination of stem, root and leaf of monocot and dicot leaf.
6. Structure of human parasite and insects mentioned in theory with the help of specimens.