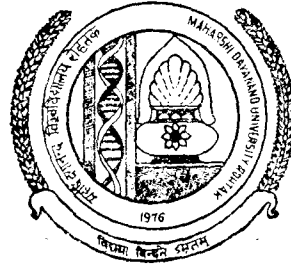


Maharshi Dayanand University Rohtak



P-

Syllabus and Courses of Reading for Diploma in Pharmacy 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 : DIPLOMA IN PHARMACY EXAMINATION

1. **Duration of the Course.** The duration of the course shall be for two academic years with each academic year spread over a period of not less than one hundred and eighty working days in addition to 500 hours practical training spread over a period of not less than 3 months, The Part-I and Part-II examinations shall be held annually ordinarily in the month of May, on the dates fixed by the Vice-Chancellor. For candidates who have failed in one or more subjects, supplementary examination shall be held ordinarily in the month of September of the same year on the dates fixed by the Vice-Chancellor.
2. The schedule of dates fixed in accordance with Clause-I shall be notified by the Controller of Examinations to the Colleges recognised for this course.
3. The date fixed for the receipt of the application forms and fees for examination without and with late fees as fixed by the Vice-Chancellor shall be notified by the Controller of Examinations/Registrar.
4. A person who has passed one of the following examination with Physics, Chemistry and Biology or Maths. for admission to Diploma in Pharmacy-I Course.
 - a) 10+2 examinations (Academic Stream) in science from Board of School Education or any other examination of any Board/Univ. recognised as equivalent thereto by the M.D. University.
 - b) Intermediate examination in science recognised by the M.D. University.
 - c) The first year of the three year degree course, in science recognised by the M.D. University.
 - d) Pre-degree examination of any University recognised by the M.D. University.
 - e) Any other qualification approved by the Pharmacy Council of India as equivalent to any of the above examination.

(ii)

5. A person who has passed Diploma in Pharmacy (Part-I) examination of this University or an examination recognised as equivalent thereto shall be eligible to join the second year Diploma in Pharmacy Class. A candidate who appears in all the subjects in the Diploma in pharmacy part-I annual examination and passes in all the subjects or fails in not more than two subjects shall be eligible to join provisionally the second year Diploma in Pharmacy Class. However, such students shall not be eligible to appear in part II examination unless they pass the part-I examination in all the subjects. A candidate who fails in more than two subjects in Diploma in pharmacy part-I examination and subsequently passes in supplementary examination shall be eligible to join Diploma in Pharmacy (part II) only in the next academic session.
6. The Diploma in pharmacy part-I/part-II examination shall be open to a student who,
 - a) has passed the requisite examination as laid down in Clauses 4&5 respectively.
 - b) has been enrolled during the one academic year preceding the examination in a college recognised for the Diploma Course.
 - c) has his name submitted to the Controller of Examinations with the following certificates signed by the Head of the College.
 - i) of good character;
 - ii) of having attended not less than 75% of full courses of lectures (both in the Theory & in Practical separately of each subject to be counted upto the last day when the classes break for preparatory holidays before the commencement of examination). A deficiency upto 10% of lectures and 5% of practicals may be condoned by the Head of the College. Provided that, a student who is detained from appearing in Diploma in Pharmacy Part-I Part-II examination due to shortage in attendance shall be required to make up the shortage by attending

regular classes in theory or practical as the case may be in the teaching session succeeding the annual examination in which he was detained and before the next succeeding annual examination, failing which he will have to attend the full course in a session in the subject(s) in which he was detained.

7. The course of study for Diploma in Pharmacy (Part-I) examination and Diploma in Pharmacy Part-II examination shall include the subjects given in the table below. The number of hours to be devoted to each subject for its teaching (Lecture and Practical) shall not be less than that given against it in column (2) and (3) of the said Table:—

Table-I (Diploma in Pharmacy Part-I)

Subject	No. of hours of theory	No. of hours of Practical
Pharmaceutics-I	75	100
Pharmaceutical Chemistry-I	75	75
Pharmacognosy	75	75
Biochemistry & Clinical Pathology	50	75
Human Anatomy & Physiology	75	50
Health Education & Community Pharmacy	50	—
	400	+ 375 = 775

Table-II (Diploma in Pharmacy Part-II)

Subject	No. of hours of theory	No. of hours of practical
Pharmaceutics-II	75	100
Pharmaceutical Chemistry-II	100	75
Pharmacology & Toxicology	75	50
Pharmaceutical Jurisprudence	50	—
Drug Store & Business Management	75	—
Hospital & Clinical Pharmacy	75	50
	450	+ 275 = 725

8. The examination shall be held according to the syllabus prescribed by the Academic Council. Each written paper shall be of 3 hours' duration. The Scheme of Examination for Diploma in Pharmacy Part-I and Part-II is given below:—

Diploma in Pharmacy (Part-I) Examination

Subject	Max. marks for theory			Max. marks for Practical		
	Exami- nation	Sessi- onal*	Total	Exami- nation	Sessi- onal	Total
Pharmaceutics-I	80	20	100	80	20	100
Pharma-Chemis- -try-I	80	20	100	80	20	100
Biochemistry & Clinical Pathology	80	20	100	80	20	100
Pharmacognosy	80	20	100	80	20	100
Human Anatomy & Physiology	80	20	100	80	20	100
Health Education & Community Pharmacy	80	20	100			
Total	480	120	600	400	100	500 =1100

*Internal Assessment

Diploma in Pharmacy (Part-II) Examination

Subjects	Max. marks for Th.			Max. marks for Pr.		
	Exami- nation	Sessi- onal*	Total	Exami- nation	Sessi- onal	Total
Pharmaceutics-II	80	20	100	80	20	100
Pharm- Chemistry-II	80	20	100	80	20	100
Pharmacology & Toxicology	80	20	100	80	20	100
Pharmaceutical Jurisprudence	80	20	100	—	—	—
Drugs Store and Business Management	80	20	100	—	—	—
Hospital & Clinical Pharmacy	80	20	100	80	20	100
Total	480	120	600	320	80	400 =1000

*Internal Assessment

A candidate who appeared in all the subjects of part-I or part-II examination but failed in some subjects shall be deemed to have been exempted from re-appearing in the subject(s) in which he has passed.

A candidate who fails in theory or practical examination of a subject shall re-appear both in theory and practical, of the same subject.

9. The fees to be paid by a candidate for each examination for a part thereof shall be:—

- a) Part-I examination Rs. 60/- (Regular) Rs. 70/- (Private)
- b) Part-II examination Rs. 100/- (Regular) Rs. 100/- (Private)

10 The marks for the sessional record will be awarded as under :

- i) A regular record of both theory and practical class work and examinations conducted in an institution imparting training for Diploma in Pharmacy (Part-I) and part-II courses shall be maintained for each student in the institution and 20 marks for each theory and 20 marks for each practical subject shall be allotted as sessionals.
- ii) There shall be atleast two periodic sessional examinations during each academic year. The highest aggregate of any two performances shall form the basis of Calculating sessional marks.
- iii) The sessional marks in practicals shall be allotted on the following basis.
 - a) Actual performance in the sessional examination
= 10 marks
 - b) Day to day assessment in the practical class work
= 10 marks
- iv) Candidates who wish to improve sessional marks can do so, by appearing in two additional sessional examinations during the next academic year. The average score of the two examinations shall be the basis for improved sessional marks in theory. The sessional of practicals shall be improved by appearing in additional practicals

examinations. Marks awarded to a candidate for day to day assessment in the practical class, cannot be improved unless he/she attend a regular course of study again.

11. **Minimum Marks for passing the examination :-**A student shall not be declared to have passed Diploma in Pharmacy examination unless he/she secure atleast 40% marks in each of the subject separately in the theory examination, including sessional marks and atleast 40% marks in each of the practical examinations including sessional marks. The candidates securing 60% marks or above in aggregate in all subjects in a single attempt at the Diploma in Pharmacy Part-I or Diploma in Pharmacy (Part-II) examinations shall be declared to have passed in 1st class the Diploma in Pharmacy (Part-I) or II Exams. as the case may be. Candidates securing 75% marks or above in any subject or subjects shall be declared to have passed with distinction in that subject or those subjects provided he/she passes in all the subjects in a single attempt.
- 12 (i) A candidate who appears in all the subjects but fails in some subjects at the Ist year of the Diploma in Pharmacy Course, may at his option take the examination in parts or in all the subjects in which he has failed, on the conditions that he passes in all the subjects prescribed for the examination in four consecutive examinations or within a period of two years, including the examination at which he first appeared. If he does not pass the full examination within a period of two years as mentioned above, he shall be deemed to be unfit for the Diploma in Pharmacy Course and not allowed to seek re-admission for this course in any college recognised by the M.D. University.
- (ii) A candidate who appeared in all the subjects in the final examinations of the Diploma in Pharmacy Course but fails in some subjects may at his option take the examinations in parts or in all the subjects in which he has failed on the condition that he passes in all subjects prescribed for the examination in four consecutive

examinations or within a period of two years including the examination at which he first appeared. If he does not pass the full examination within a period of two years as mentioned above, he shall be eligible to appear only if he joins the college, afresh and pursues regular course of study for the second year class.

13. Every successful candidate shall be granted a certificate-cum-detail marks card after having passed the examination for the diploma in Pharmacy (Part-II). Such a candidate shall not be registered as Pharmacist unless he/she undergoes a compulsory training of 3 months mentioned in Part-III.

DIPLOMA IN PHARMACY (PART III)

Practical Training

Period and other conditions of Practical Training.

14. After having appeared in the Diploma in Pharmacy (Part-II) examination the students shall have to undergo a practical training of 3 months as mentioned below, which will be recognised only if the candidates qualify the part-II examination. Training in Pharmacy in a hospital/institution duly recognised for this purpose by the Pharmacy Council of India, which shall be of not less than 500 hrs. spread over a period of three months, provided that not less than 250 hrs are devoted to actual dispensing of prescription. In the course of Pharmacy training the persons shall acquire:
 - i) Working knowledge of keeping of records required by various Acts concerning the profession of pharmacy, and
 - ii) Practical experience in :—
 - a) the manipulation of pharmaceutical apparatus in common use.
 - b) the reading translation and copying of prescription including checking of doses;
 - c) the dispensing of prescriptions illustrating the commoner methods of administering medicaments; and
 - d) the storage of drugs and medicinal preparations.
15. After passing Diploma in Pharmacy (Part-II) examination after a successful completion of Practical Training for a period of 3 months, a candidate shall be awarded a certificate of Diploma in Pharmacy.

16. Notwithstanding the integrated nature of this course which is spread over more than one academic year, the Ordinance in force at the time a student joins the course shall hold good only for the examination (s) held during or at the end of the academic year and nothing in this Ordinance shall be deemed to debar the University for amending the Ordinance and the amended ordinance, if any shall apply to all students whether old or new.

**SCHEME OF EXAMINATION FOR DIPLOMA IN
PHARMACY COURSE**

PART-I

Subject of Examination	Total marks for theory including sessional	Total marks for Practical Exam. Including sessional
1	2	3
Pharmaceutics-I	100	100
Pharmaceutical Chemistry-I	100	100
Pharmacognosy	100	100
Biochemistry & Clinical Pathology	100	100
Human Anatomy & Physiology	100	100
Health Education & Community Pharmacy	100	—
Total	600	500
	+	=1100

PART-II

Pharmaceutics-II	100	100
Pharmaceutical Chemistry-II	100	100
Pharmacology & Toxicology	100	100
Pharmaceutical Jurisprudence	100	—
Drug Store & Business Management	100	—
Hospital and Clinical Pharmacy	100	100
Total	600	400
	+	=1000

Note : Both for Part-I and Part-II

- 1 In each subject the marks for the University theory examination shall be as under :-

University Examination	80 Marks
Sessional (Theory)	20 Marks

Total	<u>100 Marks</u>
-------	------------------

- 2 In each subject the marks for the University practical examination shall be as under :

University practical Examination	80 Marks
Sessional (Practical)	20 Marks
	<hr/>
	100 Marks
	<hr/>

Each written examination (Paper) shall be of three hours duration, which is conducted by the University.

PRACTICAL TRAINING (PART-III)

Period and other conditions of Practical Training

After having appeared in the Diploma in Pharmacy (Part-II) Examination the students shall have to undergo practical training of 3 months as mentioned below, which will be recognised only if the candidates qualify the Part-II examination.

Training in Pharmacy in a hospital/institution duly recognised for this purpose by the Pharmacy Council of India, which shall be of not less than 500 hours spread over a period of three months, provided that not less than 250 hours are devoted to actual dispensing of prescriptions. In the course of Pharmacy training the persons should acquire:

- i) Working knowledge of keeping of records required by various Acts affecting the profession of Pharmacy and
- ii) Practical experience in :-
 - a) the manipulation of pharmaceutical apparatus in common use.
 - b) the reading translation and copying of prescription including checking of doses:
 - c) the dispensing of prescriptions illustrating the common methods of administering medicaments; and
 - d) the storage of drugs and medical preparations.

Procedure to be followed prior to commencing of the training :

1. The Head of the College, on application, shall supply in triplicate practical training contract form for qualification as a Pharmacist (herein after referred to as the Contract Form) to person eligible to undertake the said practical training. The contract for shall be as specified in the Appendix.
2. The Head of the College shall fill SECTION-I of the Contract Form. The trainee shall fill SECTION-II of the said Contract Form and the Head of the Hospital agreeing to impart the training shall fill SECTION-III of the Contract Form.
3. It shall be the responsibility of the trainee to ensure that one copy hereinafter referred to as the first copy of the Contract Form so filled is submitted to the Head of the College and the other two copies (herein after referred to as the second copy) and the third copy shall be filled with the Head of the Hospital pending completion of the training.

Certificate of passing Diploma in Pharmacy (Part-III)

4. On completion of the training the Head of the Hospital shall fill SECTION-IV of the second copy and third copy of the Contract Form and cause it to be sent to Head of the College who shall suitably enter in the first copy of the entries from the second copy and third copy and shall fill SECTION-V of the three copies of Contract Form and thereafter send the second copy to the M D. University and handover third copy to the trainee. This, if completed in all respects shall be regarded as a certificate of having successfully completed the course of Diploma in Pharmacy (Part-III).

APPENDIX
PRACTICAL TRAINING CONTRACT FORM FOR
PHARMACISTS
SECTION-I

This form has been issued to... ..
(Name of student pharmacist)

Son of/daughter of... ..
residing at... .. who has appeared in the
M.D. University, Diploma in Pharmacy (Part-II) examination
held in

No... .. Head of the Academic
Dated... .. Training Institution

PRACTICAL TRAINING CONTRACT FORM FOR
PHARMACISTS
SECTION-II

I... .. accept
(Name of the student Pharmacist)

... .. of
(Name of the Apprentice Master) (Name of the Institution/
Hospital)

as my Apprentice Master for the above training and I agree
to obey and respect him/her during the entire period of my
training.

Dated... ..
(Signature of student Pharmacist)

PRACTICAL TRAINING CONTRACT FORM FOR
PHARMACISTS
SECTION III

I, ----- accept
(Name of the Apprentice Master)

----- as a
(Name of the student Pharmacist)

trainee and I agree to give him/her training facilities in my orga-
nisation so that during his/her training he/she may acquire

1. Working knowledge of keeping of records required by various Acts affecting the profession of pharmacy; and
2. Practical experience in—
 - (a) the manipulation of pharmaceutical apparatus in common use;
 - (b) the reading, translation and copying of prescriptions including the checking of doses;
 - (c) the dispensing of prescriptions illustrating the common methods of administering medicaments; and
 - (d) the storage of drugs and medicinal preparations.

I also agree that a Registered Pharmacist shall be assigned for his/her guidance.

No. —————

Dated: —————

(Apprentice Master)

(Name and address of the Institution)

Practical Training Contract Form for Pharmacist

Section IV

I certify that— —————

(Name of the student Pharmacist)

Has undergone— ————— hours training spread over— ————— months in accordance with the details enumerated in Section III.

No.— —————

Dated: —————

Head of the Hospital/Institution

Practical Training contract form for pharmacist

Section V

I certify that ————— has completed

(Name of Student Pharmacist)

in all respect his practical training under regulation No. 14 of ordinance for Diploma in Pharmacy course of M.D. University. He has his practical training in an institution/hospital approved by Pharmacy Council of India.

No. —————

Dated: —————

Head of the Academic Institution

SYLLABUS DIPLOMA IN PHARMACY (PART-I)

1.1 PHARMACEUTICS—I

Theory (75 hours)

1. Introduction of different dosage forms. Their classification with examples-their relative applications. Familiarisation with new drug delivery systems.
2. Introduction to Pharmacopoeias with special reference to the Indian Pharmacopoeia.
3. Metrology-Systems of weights and measures. Calculations including conversion from one to another system, Percentage calculations and adjustment of products. Use of alligation method in calculations. Isotonic solutions.
4. Packaging of Pharmaceuticals Desirable features of a container-types of containers Study of glass and plastics as materials for containers and rubber as a material for closures-their merits and demerits. Introduction to aerosol packaging.
5. Size reduction-Objectives, and factors affecting, size reduction methods of size reduction-Study of Hammer mill, Ball mill, Fluid energy Mill and Disintegrator.
6. Size separation-Size separation by sifting. Official standards for powders. Sedimentation methods of size separation. Construction and working of Cyclone separator.
7. Mixing and Homogenisation - Liquid mixing and powder mixing, Mixing of semisolids. Study of Silverson Mixer-Homogeniser, Planetary Mixer, Agitated powder mixer: Triple Roller Mill; Propeller Mixer, Colloid Mill and Hand Homogeniser. Double cone mixer.
8. Clarification and Filtration-Theory of filtration, Filter media Filter aids and selection of filters. Study of the following filtration equipments-Filter Press, Sintered Filters, Filter candle, metafilter.
9. Extraction and Galenicals -(a) Study of percolation and maceration and their modifications, continuous hot extraction- Applications in the preparation of tinctures and extracts.
b) Introduction to Ayurvedic dosage forms.

10. Heat processes - Evaporation - Definition-Factors - affecting evaporation-Study of evaporating still and Evaporating Pan.
11. Distillation-Simple distillation and Fractional distillation; Steam distillation and vacuum distillation. Study of vacuum still, preparation of purified water I.P. and water for Injection I.P. Construction and working of the still used for the same.
12. Introduction to drying processes - Study of Tray Dryers: Fluidized Bed Dryer, vacuum Dryer and Freeze Dryer.
13. Sterilization-Concept of sterilization and its differences from disinfection- Thermal resistance of micro organisms. Detailed study of the following sterilisation processes.
 - i) Sterilization with moist heat,
 - ii) Dry heat sterilization,
 - iii) Sterilization by radiation,
 - iv) Sterilization filtration and
 - v) Gaseous sterilization.

Aseptic techniques - Application of sterilization processes in hospitals particularly with reference to surgical dressings and intravenous fluids. Precautions for safe and effective handling of sterilization equipment.
14. Processing of Tablets - Definition: Different types of compressed tablets and their properties. Processes involved in the production of tablets; Tablets excipients; Defects in tablets; Evaluation of Tablets; Physical standards including Disintegration and Dissolution. Tablet coating-Sugar coating; film coating, enteric coating and microencapsulation (Tablet coating may be dealt in an elementary manner).
15. Processing of Capsules-Hard and soft gelatin capsules; different sizes of capsules: filling of capsules, handling and storage of capsules. Special applications of capsules.
16. Study of immunological products like sera, vaccines, toxoids & their preparations.

PRACTICAL (100 hours)

Preparation (minimum number stated against each) of the following formulations illustrating different techniques involved.

1. Aromatic Waters	3	8. Capsules	2
2. Solutions	4	9. Tablets	2
3. Spirits	2	10. Preparations involving sterilisation	2
4. Tinctures	4	11. Ophthalmic preparations	2
5. Extracts	2	12. Preparations involving aseptic techniques	2
6. Creams	2		
7. Cosmetic preparations	3		

Books Recommended : (Latest editions)

1. Remington's Pharmaceutical Sciences.
2. The Extra Pharmacopoeia-Martindale.

1.2 PHARMACEUTICAL CHEMISTRY-I**Theory (75 Hours)**

1. General discussion on the following inorganic compounds including important physical and chemical properties, medicinal and pharmaceutical uses, storage conditions and chemical incompatibility.
 - A) Acids, bases and buffers-Boric acid*, Hydrochloric acid, strong ammonium hydroxide, Calcium hydroxide, Sodium hydroxide and official buffers.
 - B) Antioxidants-Hypophosphorous acid, Sulphur dioxide, Sodium bisulphite, Sodium meta-bisulphite, Sodium thiosulphate, Nitrogen and sodium Nitrite.
 - C) Gastrointestinal agents-
 - i) Acidifying agents-Dilute hydrochloric acid
 - ii) Antacids-Sodium bicarbonate, Aluminium hydroxide gel, Aluminium Phosphate, Calcium carbonate, Magnesium Carbonate, Magnesium trisilicate, Magnesium oxide, combinations of antacid preparations.
 - iii) Protectives and Adsorbents-Bismuth subcarbonate and kaolin.

iv) Saline cathartics-Sodium Potassium tartrate and Magnesium sulphate.

D) Topical Agents-

i) Protectives-Talc, Zinc Oxide, Calamine Zinc stearate Titanium dioxide Silicon polymers.

ii) Antimicrobials and Astringents-Hydrogen peroxide*, Potassium permanganate, Chlorinated lime, Iodine, Solutions of iodine, Povidone-iodine, Boric acid, Borax, Silver nitrate, Mild silver protein, Mercury, Yellow mercuric oxide, Ammoniated mercury.

iii) Sulphur and its compounds-sublimed sulphurs, Precipitated sulphur, Selenium sulphide.

iv) Astringents:- Alum and Zinc Sulphate.

E) Dental Products-Sodium fluoride, stannous fluoride, Calcium carbonate, Sodiummeta phosphate, Dicalcium phosphate, Strontium chloride, Zinc chloride

F) Inhalants-Oxygen, Carbon dioxide, Nitrous oxide.

G) Respiratory Stimulants—Ammonium carbonate.

H) Expectorants and Emetics—Ammonium chloride, Potassium iodide, Antimony Potassium tartarate.

I) Antidotes—Sodium nitrite.

2. Major Intra and Extracellular electrolytes

a) Electrolytes used for replacement therapy Sodium chloride and its preparations, Potassium chloride and its preparations.

b) Physiological acid-base balance and electrolytes used—Sodium acetate, Potassium acetate, Sodium bicarbonate injection, Sodium citrate, Potassium citrate, Sodium lactate injection, Ammonium chloride and its injection.

c) Combination of oral electrolyte powders and solutions.

3. Inorganic Official compounds of Iron, Iodine and Calcium Ferrous Sulphate and calcium gluconate.
4. Radio pharmaceuticals and Contrast media - Radio activity- Alpha, Beta and Gamma Radiations. Biological effects of Radiations, Measurement of radio-activity G.M. Counter Radio isotopes -their uses, storage and precautions with special reference to the officia preparations Radio opaque Contrast media--Barium sulphate.
5. Quality control of Drugs and Pharmaceuticals—Importance of quality control, significant errors, methods used for quality control, sources of impurities in Pharmaceuticals, Limit tests for Arsenic, chloride, Sulphate Iron and Heavy metals.
6. Identification tests for cations and anions as per Indian Pharmacopoeia.

PRACTICAL (75 hours)

1. Identification tests for Inorganic compounds particularly drugs and pharmaceuticals.
2. Limit test for chloride, sulphate, Arsenic, Iron and Heavy metals.
3. Assay of inorganic Pharmaceuticals involving each of the following methods of compounds marked with (*) under theory.
 - a) Acid-Base titrations (atleast 3)
 - b) Redox titrations (One each of Permanganometry and iodimetry.
 - c) Precipitation titrations (at least 2)
 - d) Complexometric titrations (Calcium and Magnesium).

Books Recommended (Latest editions)

1. Indian Pharmacopoeia.

1.3 PHARMACOGNOSY

Theory (75 hours)

1. Definition, history and scope of Pharmacognosy including indigenous system of medicine.
2. Various systems of classification of drugs of natural origin.
3. Adulteration and drug evaluation: significance of Pharmacopoeial standards.
4. Brief outline of occurrence, distribution outline of isolation, identification tests, therapeutic effects and pharmaceutical applications of alkaloids, terpenoids, glycosides, volatile oils, tannins and resins.
5. Occurrence, distribution, organoleptic evaluation, chemical constituents including tests wherever applicable and therapeutic efficacy of following categories of drugs.
 - a) Laxatives: Aloes, Rhubarb, Castor oil, Ispaghula, Senna.
 - b) Cardiotonics—Digitalis, Arjuna.
 - c) Carminatives & G.I. regulators Umbelliferous fruits Coriander, Fennel, Ajowan, Cardamom, Ginger, Black pepper, Asafoetida, Nutmeg, Cinnamon, Clove
 - d) Astringents—Cinchu
 - e) Drugs acting on nervous system Hyoscyamus, Belladonna Aconite, Ashwagandha, Ephedra, Opium, Cannabis, Nuxvomica
 - f) Antihypertensives Rauwolfia
 - g) Antitussives—Vasaka, Tolu balsam, Tulsi.
 - h) Antirheumatics Guggul, Colchicum.
 - i) Antitumour—Vinca.
 - j) Antileprotics—Chaulmoogra Oil.
 - k) Antidiabetics—Pterocarpus, Gymnema, Sylvestro.
 - l) Diuretics—Gokhru, Punarnava.
 - m) Antidysenterics—Ipecacuanha.
 - n) Antiseptics and disinfectants Benzoin, Myroh, Nim, curcuma
 - o) Antimalarials—Cinchona.
 - p) Oxytocics—Ergot

- q) Vitamin-s Shark liver Oil and Amla.
 - r) Enzymes Papaya, Diastase, Yeast
 - s) Perfumes and flavouring Agents--Peppermint Oil, Lemon Oil, Orange Oil, Lemon grass Oil, Sandal wood.
 - t) Pharmaceutical aids-Honey, Arachis Oil, Starch, Kaolin, Pectin, Olive oil, Lanolin, Beeswax, Acacia, Tragacanth Sodium alginate, Agar, Guar gum, Gelatin.
 - u) Miscellaneous-Liquorice, Garlic, Picrorhiza, Dioscorea, Linseed, Shatavari, Shankhapushpi, Pyrethrum, Tobacco.
6. Collection and preparation of crude drugs for the market as exemplified by Ergot, opium, Rauwolfia, Digitalis, Senna
 7. Study of source, preparation and identification of fibres used in sutures and surgical dressings-cotton, silk, wool and regenerated fibres.
 8. Gross anatomical studies of - Senna, Datura, Cinnamomum, Cinchona, Fennel, Clove, Ginger, Nuxvomica & ipecacuanha

PRACTICAL (75 hours)

1. Identification of drugs by morphological characters.
2. Physical and chemical tests for evaluation of drugs wherever applicable.
3. Gross anatomical studies (t.s.) of the following drugs senna, Datura, Cinnamon, Cinchona, Coriander, Fennel, Clove, Ginger, Nuxvomica Ipecacuanha.
4. Identification of Fibres and surgical dressings.

1.4 BIOCHEMISTRY AND CLINICAL PATHOLOGY

Theory (50 hours)

1. Introduction to biochemistry.
2. Brief chemistry and role of proteins, polypeptides and amino acids, classification, qualitative tests, Biological value, Deficiency diseases.

3. Brief chemistry and role of Carbohydrates. Classification, qualitative tests. Diseases related to carbohydrate metabolism.
4. Brief chemistry and role of Lipids, Classification, qualitative tests. Diseases related to lipids metabolism.
5. Brief chemistry and role of Vitamins and Coenzymes.
6. Role of minerals and water in life processes.
7. Enzymes : Brief concept of enzymic action. Factors affecting it. Therapeutic and pharmaceutical importance.
8. Brief concept of normal and abnormal metabolism of proteins, carbohydrates and lipids.
9. Introduction to pathology of blood and urine.
 - a) Lymphocytes and Platelets, their role in health and disease.
 - b) Erythrocytes - Abnormal cells and their significance.
 - c) Abnormal constituents of urine and their significance in diseases.

PRACTICAL (75 hours)

1. Detection and identification of Proteins, Amino acids, Carbohydrates and Lipids.
2. Analysis of normal and abnormal constituents of Blood and urine (Glucose, Urea, Creatine, creatinine, cholesterol alkaline phosphatase, acid phosphatase, Billrubin, SCPT, SGOT, Calcium, Diastase, Lipase).
3. Examination of sputum and faeces (microscopic & staining).
4. Practice in injecting drugs by intramuscular, subcutaneous and intravenous routes. Withdrawal of blood samples.

1.5 HUMAN ANATOMY AND PHYSIOLOGY

Theory (75 hours)

1. Scope of Anatomy and Physiology.
Definition of various terms used in Anatomy.
2. Structure of cell, function of its components with special reference to mitochondria and microsomes.

3. Elementary tissues of the body, i e. epithelial tissue, muscular tissue, connective tissue and nervous tissue.
4. Structure and function of skeleton, Classification of joints and their function, joint disorder.
5. Composition of blood, functions of blood elements, Blood group and coagulation of blood. Brief information regarding disorders of blood.
6. Name and functions of lymph glands.
7. Structure and functions of various parts of the heart. Arterial and venous system with special reference to the names and positions of main arteries and veins. Blood pressure and its recording. Brief information about cardiovascular disorders.
8. Various parts of respiratory system and their functions. Physiology of respiration.
9. Various parts of urinary systems and their functions, structure and functions of kidney. Physiology of urine formation. Pathophysiology of renal diseases and oedema.
10. Structure of skeletal muscle. Physiology of muscle contraction. Names, positions, attachments and functions of various skeletal muscles. Physiology of neuromucular junction.
11. Various parts of central nervous system, brain and its parts, functions and reflex action. Anatomy and Physiology of autonomic nervous system.
12. Elementary knowledge of structure and functions of the organs of taste, smell, ear, eye and skin. Physiology of pain.
13. Digestive system: names of the various parts of digestive system and their functions. Structure and functions of liver, physiology of digestion and absorption.
14. Endocrine glands and Hormones. Locations of the glands, their hormones and functions.
Pituitary, thyroid, Adrenal and Pancreas.
15. Reproductive system -- Physiology and Anatomy of Reproductive system.

PRACTICAL (50 Hours)

1. Study of the human skeleton.
2. Study with the help of charts and models of the following systems and organs:
 - a) Digestive system
 - b) Respiratory system.
 - c) Cardiovascular system.
 - d) Urinary system.
 - e) Reproductive system.
 - f) Nervous system.
 - g) Eye
 - h) Ear
3. Microscopic examination of epithelial tissue, cardiac muscle, smooth muscle, skeletal muscle. Connective tissue and nervous tissues.
4. Examination of blood films for TLC, DLC and malarial parasite.
5. Determination of clotting time of blood, erythrocyte sedimentation rate and Haemoglobin value.
6. Recording of body temperature, pulse, heart rate, blood pressure and ECG.

1.6 HEALTH EDUCATION AND COMMUNITY PHARMACY

Theory (50 hours)

1. Concept of Health-Definition of physical health, mental health, Social health, spiritual health-determinants of health, indicators of health, concept of disease natural history of diseases, the disease agents, concept of prevention of diseases.
2. Nutrition and health-Classification of foods, requirements disease induced due to deficiency of proteins, vitamins and minerals-treatment and prevention.
3. Demography and family planning-Demography cycle, fertility, family planning, contraceptive methods, behavioural methods, natural family planning method, chemical method,

mechanical methods. hormonal contraceptives, population-problem of India.

4. First aid-Emergency treatment in shock, snake-bite, burns, poisoning, heart disease, fractures and resuscitation methods. Elements of minor surgery and dressings.
5. Environment and health-Sources of water supply, water pollution, purification of water, health and air, noise, light-solid waste disposal and control-medical entomology, arthropod borne diseases and their control. rodents, animals and diseases.
6. Fundamental principles of microbiology-classification of microbes, isolation, staining techniques of organisms of common diseases.
7. Communicable diseases-Causative agents, mode of transmission and prevention.
 - a) Respiratory infections-Chicken pox, measles, influenza, Diphtheria, whooping cough and tuberculosis.
 - b) Intestinal infections: Poliomyelitis Hepatitis Cholera, Typhoid, Food poisoning, Hookworm infection.
 - c) Arthropod borne infections-Plague Malaria, Filariasis-
 - d) Surface infections-Rabies, Trachoma, Tetanus, Leprosy.
 - e) Sexually transmitted diseases-Syphilis, Gonorrhoea, AIDS.
8. Non-communicable diseases-Causative agents, prevention, care and control.
Cancer, Diabetes. Blindness, Cardiovascular diseases.
9. Epidemiology-Its scope, methods, uses, dynamics of disease transmission. Immunity and immunisation: Immunological products and their dose schedule. Principles of disease control and prevention, hospital acquired infection, prevention and control. Disinfection, types of disinfection, disinfection procedures, for faeces, urine, sputum, room, linen, dead-bodies, instruments.

2.1 PHARMACEUTICS-II

Theory (75 hours)

1. Dispensing Pharmacy :

- i) Prescriptions-Reading and understanding of prescriptions; Latin terms commonly used (Detailed study is not necessary). Modern methods of prescribing, adoption of metric system. Calculations involved in dispensing.
- ii) Incompatibilities in Prescriptions-Study of various types of incompatibilities-physical, chemical and therapeutic.
- iii) Posology-Dose and dosage of drugs, Factors influencing dose, Calculations of doses on the basis of age, sex and surface area. Veterinary doses.

2. Dispensed Medications :

(Note : A detailed study of the following dispensed medication is necessary. Methods of preparation with theoretical and practical aspects, use of appropriate containers and closures. Special labelling requirements and storage conditions should be high-lighted).

- i) Powders-Types of Powders-Advantages and disadvantages of powders, Granules, Cachets and Tablet triturates. Preparation of different types of powders encountered in prescriptions. Weighing methods possible errors in weighing minimum weighable amounts and weighing of a material below the minimum weighable amount, geometric dilution and proper usage and care of dispensing balance.
- ii) Liquid Oral Dosage Forms^{*}
 - a) Monophasic-Theoretical aspects including commonly used vehicles, essential adjuvant like stabilizers, colourants and flavours, with examples.

Review of the following monophasic liquids with details of formulation and practical methods.

Liquids for internal administration	Liquids for external administration or used on mucus membranes
Mixtures and concentrates Syrups	Gargles Mouth Washes Throat-paints Douches Ear Drops
Elixirs	Nasal Drops & Sprays Liniments Lotions

b) Biphasic Liquid Dosage Forms:

- i) Suspensions (elementary study)-Suspensions containing diffusible solids and liquids and their preparations. Study of the adjuvants used like thickening agents, wetting agents, their necessity and quantity to be incorporated. Suspensions of precipitate forming liquids like tinctures, their preparations and stability. Suspensions produced by chemical reaction. An introduction to flocculated/non-flocculated suspension system.
- ii) Emulsions-Types of emulsions, identification of emulsion systems, formulation of emulsions. Selection of emulsifying agents. Instabilities in emulsions. Preservation of emulsions.
- iii) Semi-Solid Dosage Forms :
 - a) Ointments-Types of ointments, classification and selection of dermatological vehicles. Preparation and stability of ointments by the following processes:
 - i) Trituration
 - ii) Fusion
 - iii) Chemical reaction
 - iv) Emulsification.
 - b) Pastes-Differences between ointments and Pastes Bases of pastes. Preparation of pastes and their preservation.

- c) **Jellies**-An introduction to the different types of jellies and their preparation.
 - d) An elementary study of poultice.
 - e) **Suppositories and pessaries**-Their relative merits and demerits, types of suppositories, suppository bases, classification, properties, preparation and packing of suppositories. Use of suppositories for drug absorption.
- iv) **Dental and Cosmetic Preparations :**
Introduction to **Dentrifices**, Facial cosmetics, Deodorants, Antiperspirants, Shampoos, Hair dressings and Hair removers.
- v) **Sterile Dosage Forms :**
- a) **Parenteral dosage forms**-Definitions, General requirements for parenteral dosage forms. Types of parenteral formulations, vehicles, adjuvants, processing, personnel, facilities and Quality control. Preparation of Intravenous fluids and admixtures Total parenteral nutrition, Dialysis fluids.
 - b) Sterility testing, particulate matter monitoring -- Faulty scale-packaging.
 - c) **Ophthalmic Products**-Study of essential characteristics of different ophthalmic preparations. Formulation additives, special precautions in handling and storage of ophthalmic products.

PRACTICAL (100 hours)

Dispensing of at least 100 products covering a wide range of preparations such as mixtures emulsions, lotions, liniments, E.N.T. preparations, ointments, suppositories, powders, incompatible prescriptions etc.

Books Recommended : (Latest editions)

1. Indian Pharmacopoeia.
2. British Pharmacopoeia.
3. National Formularies (N.F.I., B.N.F)
4. Remington's Pharmaceutical Sciences.
5. Martindale's Extra Pharmacopoeia.

2.2 PHARMACEUTICAL CHEMISTRY II

Theory (100 hours)

1. Introduction to the nomenclature of organic chemical systems with particular reference to hetero-cyclic system containing upto 3 rings.
2. The Chemistry of following Pharmaceutical organic compounds, covering their nomenclature, chemical structure, uses and the important physical and Chemical properties (Chemical structure of only those compounds marked with asterisk(*))

The stability and storage conditions and the different type of Pharmaceutical formulations of these drugs and their popular brand names.

Antiseptics and Disinfectants—Proflavine*, Benzalkonium chloride, Cetrimide, Chloro cresol*, Chloroxylene, Formaldehyde solution, Hexachlorophene, Liquified phenol, Nitro furantoin.

Sulfonamides—Sulfadiazine*, Sulfagunidine*, Phthalyl sulfathiazole, Succinyl sulfathiazole, Sulfadimethoxine, Sulfamethoxy pyridazine, Sulfamethoxazole, Co-trimoxazole, Sulfacetamide*.

Antileprotic Drugs—Clofazimine, Thiambutosine, Dapsone*, Solapsona.

Anti-tubercular Drugs—Isoniazid*, PAS*, Streptomycin, Rifampicin, Ethambutol*, Thiacotazone, Ethionamide, Cycloserine, Pyrazinamide*.

Antiamoebic and Anthelmintic Drugs—Emetine, Metronidazole*, Halogenated Hydrox, quinolines, diloxanide furoate, Paromomycin Piperazine*, Mebendazole, D.E.C.*.

Antibiotics—Benzyl Penicillin*, Phenoxy methyl Penicillin*, Benzathine Penicillin, Ampicillin*, Cloxacillin, Carbenicillin, Gentamycin, Neomycin, Erythromycin, Tetracycline, Cephalexin, Cephaloridine, Cephalothin, Griseofulvin, Caloramphenicol.

Antifungal agents—Undecylenic acid, Tolnaftate, Nystatin, Amphoterecin, Hamycin.

Antimalarial Drugs—Chloroquine*, Amodiaquine, Primaquine, Proguanil, Pyrimethamine*, Quinine, Trimethoprim.

Tranquilizers- Chlorpromazine*, Prochlor, Perazine, Trifluo, Perazine, Throthixene, Haloperidol*, Triperidol, Oxypertine, Chlordiazepoxide, Diazepam*, Lorazepam*, Meprobamate.

Hypnotics:- Phenobarbitone*, Butobarbitone, Cyclobarbitone, Nitrazepam, Glutethimide*, Methypylon, Paraldehyde, Triclofos sodium.

General Anaesthetics--Halothane*, Cyclopropane*, Diethyl ether*, Metho-hexital sodium, Thiopental Sodium, Trichloro ethylene.

Antidepressant Drugs-- Amitriptyline, Nortriptyline, Imipramine*, Phenelzine, Tranyl cypromine.

Analeptics--Theophylline, Caffeine*, Coramine*, Dextroamphetamine.

Adrenergic Drugs - Adrenaline*, Noradrenaline, Isoprenaline* Phenylephrine, Salbutamol, Terbutaline, Ephedrine*, Pseudo ephedrine.

Adrenergic Antagonist-Tolazoline, Propranolol*, Practalol.

Cholinergic Drugs-Neostigmine*, Pyridostigmine, Pralidoxime, Pilocarpine, Physostigmine*.

Cholinergic Antagonists - Atropine*, Hyosgine, Homatropine, Propanteline*, Benztropine, Tropicamide, Biperiden*.

Diuretic Drugs Furosemide*. Chlorothiazide, Hydrochlorothiazide*.

Benzthiazide, Urea*, Mannitol*, Ethacrynic Acid.

Cardiovascular Drugs - Ethyl nitrite*, Glyceryl trinitrate, Alpha methyl dopa, Guanethidine, Clofibrate, Quinidine.

Hypoglycemic Agents --Insulin, Clorpropamide*, Tolbutamide, Glibenclamide, Phenformin*, Metformin.

Coagulants and Anti Coagulants--Heparin, Thrombin, Menadi-one*, Bishydroxycoumarin, Warfarin Sodium.

Local Anaesthetics--Lignocaine*, Procaine*, Benzocaine.

Histamine and Anti Histaminic Agents--Histamine, Diphenhydramine*, Promethazine, Cyproheptadine, Mepyramine, Pheniramine, Chlorpheniramine*.

Analgesics and Anti-pyrotics—Morphine, Pethidine*, Codeine, Methadone, Aspirin*, Paracetamol*, Analgin, Dextropropoxyphene, Pentazocine.

Non-steroidal anti-inflammatory Agents-Indomethacin*, phenylbutazone*, Oxyphen butazone, Ibuprofen.

Thyroxine and Antithyroids-Thyroxine*, Methimazole, Methyl thiouracil, Propylthiouracil.

Diagnostic Agents--Iopanoic Acid, Propyliodone, Sulfbromophthalein Sodium, Indigotindisulfonate Sodium (Indigo Carmine), Evans blue, Congo Red, Fluorescein Sodium.

Anticonvulsants, cardiac glycosides Antiarrhythmic antihypertensives & vitamins

Steroidal Drugs - Betamethazone, Cortisone, Hydrocortisone, prednisolone, Progesterone, Testosterone, Oestradiol Nandrolone.

Anti-Neoplastic Drugs--Actinomycins Azathioprine, Busulphan, Chlorambucil, Cisplatin, cyclophosphamide, Daunorubicin, Hydrochloride, Fluorouracil, Mercaptopurine, Methotrexate, Mytomycin.

Books Recommended : (Latest editions)

1. Pharmacopoeia of India.
2. British Pharmaceutical Codex
3. Martindale's Extra Pharmacopoeia.

PRACTICAL (75 hours)

1. Systematic qualitative testing of organic drugs involving Solubility determination, melting point and/or boiling point, detection of elements and functional groups (10 compounds).
2. Official identification tests for certain groups of drugs included in the I.P. like barbiturates, sulfonamides, phenothiazines, Antibiotics etc. (8 compounds).
3. Preparation of three simple organic preparations.

2.3 PHARMACOLOGY & TOXICOLOGY

Theory (75 hours)

1. Introduction to Pharmacology, scope of Pharmacology.
2. Routes of administration of drugs, their advantages and disadvantages.

3. Various processes of absorption of drugs and the factors affecting them. Metabolism, distribution and excretion of drugs.
4. General mechanism of drugs action and the factors which modify drug action.
5. Pharmacological classification of drugs. The discussion of drugs should emphasise the following aspects:
 - (i) Drugs acting on the Central Nervous system :
 - (a) General anaesthetics, adjunction to anaesthesia, intravenous anaesthetics.
 - (b) Analgesic, antipyretic and non-steroidal anti-inflammatory drugs, Narcotic analgesics. Antirheumatic and antigout remedies.
Sedatives and Hypnotics, Psychopharmacological agents. anti convulsants analeptics,
 - (c) Centrally acting muscle relaxants and antiparkinsonism agents.
 - (ii) Local anaesthetics.
 - (iii) Drugs acting on autonomic nervous system.
 - (a) Cholinergic drugs, Anticholinergic drugs. anticholinesterase drugs.
 - (b) Adrenergic drugs and adrenergic receptor blockers.
 - (c) Neurone blockers and ganglion blockers.
 - (d) Neuromuscular blockers, drugs used in myasthenia gravis.
 - (iv) Drugs acting on eye, mydriatics, drugs used in glaucoma.
 - (v) Drugs acting on respiratory system-Respiratory stimulants Bronchodilators, Nasal decongestants, Expectorants and Antitussive agents.
 - vi) Antacids, Physiological role of histamine and serotonin, Histamine and Antihistamines, Prostaglandins.
 - (vii) Cardio vascular drugs, Cardiotonics, Antiarrhythmic agents, Antianginal agents, antihypertensive agents, Peripheral Vasodilators and drugs used in atherosclerosis.

- (viii) Drugs acting on the blood and blood forming organs. Haematinics Coagulants and anticoagulants, Haemostatics, Blood substitutes plasma expanders.
 - (ix) Drugs effecting renal function-Diuretics and antidiuretics.
 - (x) Hormones and hormone antagonists-Hypoglycemic agents. Antithyroid drugs, sex hormones and oral contraceptives corticosteroids.
 - (xi) Drugs acting on digestive system-Carminatives, digestants Bitters, Antacids and drugs used in peptic ulcer, Purgatives, and laxative Antidiarrhoeals, Emetics, Antiemetics, Antispasmodics.
6. Chemotherapy of microbial disease : Urinary antiseptics. Sulphonamides, Penicillins, Streptomycin, Tetracyclines and other antibiotics.
- Antitubercular agents. Antifungal agents, antiviral drugs, antileprotic drugs.
7. Chemotherapy of protozoal diseases.
Anthelmintic drugs.
8. Chemotherapy of cancer.
9. Disinfectants and antiseptics.
- A detailed study of the action of drugs on each organ is not necessary.

PHARMACOLOGY

PRACTICAL

(50 hours)

The first six of the following experiments will be done by the students while the Remaining will be demonstrated by the teacher.

1. Effect of K^+ Ca^{++} acetylcholine and adrenaline on frog's heart.
2. Effect of acetylcholine on rectus abdominis muscle of Frog and guinea pigileum.
3. Effect of spasmogens and relaxants on rabbits intestine.
4. Effect of local anaesthetics on rabbit cornea.

5. Effect of mydriatics and miotics on rabbits eye.
6. To study the action of strychnine on frog.
7. Effect of digitalis on frog's heart.
8. Effect of hypnotics in mice.
9. Effect of convulsants and anticonvulsant in mice or rats
10. Test for pyrogens.
11. Taming and hypnosis potentiating effect chlorpromazine in mice/rats.
12. Effect of diphenhydramine in experimentally produced asthma in guinea pigs.

2.4 PHARMACEUTICAL JURISPRUDENCE

Theory (50 hours)

1. Origin and nature of pharmaceutical legislation in India, its scope and objectives. Evolution of the "Concept of Pharmacy" as an integral part of the Health care system.
2. Principles and significance of Professional Ethics. Critical study of the code of Pharmaceutical Ethics drafted by Pharmacy Council of India.
3. Pharmacy Act, 1948-The General study of the Pharmacy Act with special reference to Education Regulations, working of State and Central Councils constitution of these councils and functions. Registration procedures under the Act.
4. The Drugs and Cosmetics Act, 1940-General study of the Drugs and Cosmetics Act and the Rules thereunder. Definitions and salient features related to retail and whole sale distribution of drugs. The powers of Inspectors, the sampling procedures and the procedure and formalities in obtaining licences under the rules Facilities to be provided for running a Pharmacy effectively. General study of the schedules with special reference to schedules C, C₁, F, G, J, H, P and X and salient features of labelling and storage conditions of drugs.
5. The Drugs and Magic Remedies (Objectionable Advertisement) Act, 1954-General study of the Act, Objectives, special reference to be laid on Advertisements, Magic remedies and objectionable and permitted advertisements-diseases which cannot be claimed to be cured.

6. Narcotic, Drugs and Psychotropic substances Act, 1985-A brief study of the act with special reference to its objectives, offences and punishment.
7. Brief Introduction to the study of the following acts:
 1. Latest Drugs (Price Control) Order in force.
 2. Poisons Act, 1919 (as amended to date)
 3. Medicinal & Toilet Preparations (Excise Duties) Act, 1955 (as amended to date)
 4. Medical Termination of Pregnancy Act, 1971 (as amended to date)

Books Recommended (Latest edition)

Bare Acts of the said laws published by the Government

2 5 DRUG STORE AND BUSINESS MANAGEMENT

Theory (75 hours)

Part-I Commerce (50 hours)

1. Introduction-Trade, Industry and Commerce, Functions and subdivision of Commerce, Introduction to Elements of Economics and Management.
2. Forms of Business Organisations.
3. Channels of Distribution.
4. Drug House Management-Selection of Site, Space Lay-out and legal requirements.
Importance and objectives of Purchasing, selection of suppliers credit information, tenders, contracts and price determination and legal requirements thereto.
Codification, handling of drug stores and other hospital supplies.
5. Inventory Control-objects and importance, modern technique like ABC, VED analysis, the lead time, inventory carrying cost safety stock, minimum and maximum stock levels, economic order quantity, scrap and surplus disposal.
6. Sales Promotion, Market Research, Salesmanship, qualities of a salesman, Advertising and Window Display.
7. Recruitment, training evaluation and compensation of the pharmacist.

8. Banking and Finance-Service and functions of bank, Finance planning and sources of finance.

Part-II Accountancy (25 hours)

1. Introduction to the accounting concepts and conventions, Double entry, Book keeping Different kinds of accounts.
2. Cash Book.
3. General Ledger and Trial Balance.
4. Profit and Loss Account and Balance Sheet.
5. Simple techniques of analysing financial statements. Introduction to Budgetting.

Books Recommended (Latest editions)

1. Remington Pharmaceutical Sciences.

2.6 HOSPITAL AND CLINICAL PHARMACY

Theory (75 hours)

Part I : Hospital Pharmacy:

1. Hospitals --Definition, Function, Classification based on various criteria, organisation, Management and health delivery system in India.
2. Hospital Pharmacy.
 - (a) Definition
 - (b) Function and objectives of Hospital Pharmaceutical services.
 - (c) Location, Layout, Flow chart of materials and men.
 - (d) Personnel and facilities requirements including equipment based on individual and basic needs.
 - (e) Requirements and abilities required for Hospital pharmacists.
3. Drug Distribution system in Hospitals :
 - (a) Out-patient services
 - (b) In-patient services :- (a) types of services (b) detailed discussion of Unit Dose system, Floor ward stock system Satellite pharmacy services, Central sterile services, Bed Side Pharmacy.

4. Manufacturing :
 - (a) Economical considerations, estimation of demand.
 - (b) Sterile manufacture-large and small volume parenterals facilities, requirements, layout, production planning man-power requirements.
 - (c) Non-sterile manufacture-liquid orals, externals, Bulk concentrates.
 - (d) Procurement of stores and testing of raw materials.
5. Nomenclature and uses of surgical instruments and Hospital, Equipments and health accessories.
6. P.T.C. (Pharmacy Therapeutic Committee) Hospital Formulary System and their organisation, functioning, composition.
7. Drug information service and Drug Information Bulletin.
8. Surgical dressing like cotton, gauze bandages and adhesive tapes including their pharmacopoeial tests for quality. Other hospital supply eg. I.V. sets, B.G. sets, Ryals tubes, Catheters, Syringes etc.
9. Application of computers in maintenance of records, inventory control, medication monitoring, drug information and data storage and retrieval in hospital and retail pharmacy establishments.

Part II : Clinical Pharmacy

1. Introduction to Clinical Pharmacy Practice-Definition, scope
2. Modern dispensing aspects-Pharmacists and Patient counselling and advice for the use of common drugs, medication history.
3. Common daily terminology used in the practice of Medicine.
4. Disease,manifestations and pathophysiology including salient symptoms to understand the disease like Tuberculosis, Hepatitis Rheumatoid Arthritis, Cardio-vascular diseases Epilepsy, Diabetes, Peptic Ulcer, Hypertension.
5. Physiological parameters with their significance.

6. **Drug Interactions :**
 - (a) **Definition and introduction.**
 - (b) **Mechanism of Drug Interaction.**
 - (c) **Drug-drug interaction with reference to analgesics, Diuretics, Cardic Vascular drugs, Gastro-intestinal agents vitamins and hypoglycemic agents.**
 - (d) **Drug-food interaction**
7. **Adverse Drug Reaction :-**
 - (a) **Definition and significance.**
 - (b) **Drug-induced diseases and Teratogenicity.**
8. **Drugs in Clinical Toxicity-Introduction, general treatment of poisoning, systematic antidotes. Treatment of insecticide poisoning, heavy metal poison, Narcotic drugs, Barbiturate, Organophosphorus poisons**
9. **Drug dependances, Drug abuse, Addictive drugs and their treatment, complications.**
10. **Bio-availability of drugs, including factors affecting it.**

Books Recommended (Latest editions)

1. **Remington's Pharmaceutical Sciences.**
2. **Martindale's Extra Pharmacopoeia.**

PRACTICAL (50 hours)

1. **Preparation of transfusion fluids.**
2. **Testing of raw materials used in (1).**
3. **Evaluation of surgical dressings.**
4. **Sterilization of surgical instruments, glass ware and other hospital supplies.**
5. **Handling and use of data processing equipments.**