Regulations and Syllabus

For

DIPLOMA IN PHARMACY COURSE

E.R. 1991

VINAYAKA MISSION'S RESEARCH FOUNDATION,

(Deemed to be University) SALEM, INDIA

VINAYAKA MISSION'S RESEARCH FOUNDATION (DEEMED TO BE UNIVERSITY),

VINAYAKA MISSION'S COLLEGE OF PHARMACY Yercaud Main Road,

Kondappanaickenpatty, Salem – 636 008

D.PHARMACY COURSE

CHAPTER I

1. Short title and Commencement

a. These regulations may be called the Education Regulations 1991.Adopted by VMRF (DU)

2. Qualifications for Pharmacists:

The minimum qualification required for registration as a pharmacist shall be pass in Diploma in Pharmacy (Part I and Part II) and satisfactory completion of Diploma in Pharmacy (Part III).

Or

Any other qualification approved by the Pharmacy council of India as equivalent to the above.

3. Diploma in Pharmacy Part-I and Part-II shall consist of a certificate of having passed the course of study prescribed in Chapter II of these regulations.

4. Diploma in Pharmacy Part-III shall consist of a certificate of having satisfactorily completed course of practical training as prescribed in Chapter III of these regulations.

CHAPTER II
Diploma in Pharmacy (Part-I and Part-II)

5. **Minimum qualification for admission to Diploma in Pharmacy (Part-I course):**

A pass in any of the following examination with Physics, Chemistry and Biology or Mathematics.

a. Intermediate examination in Science
b. The first year of the three year degree course in science.
c. 10+2 examination (academic stream) in science
d. Pre-degree examination or
e. Any other qualification approved by the Pharmacy council of India as equivalent to any of the above examination.

[Provided that there shall be reservation of seats for Scheduled Caste and Scheduled Tribe candidates in accordance with the instructions issued by the Central Govt./State Govts./ Union Territory Administration., as the case may be, from time to time.]

6. 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.

7. Course of study

The course of study for Diploma in Pharmacy Part-I and Diploma in Pharmacy Part-II shall include the subjects as given in the Tables I&II below. The number of hours devoted to each subject for its teaching in Theory and Practical, shall not be less than that noted against it in columns 2 and 3 of the Tables below.

Table I
Diploma in Pharmacy (Part-I)

Subject	No. of hrs in Theory	No. of hrs in 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 hrs in Theory	No. of hrs in 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 Syllabi for each subject of study in the said Tables shall be as specified in Appendix A to these regulations.

9. Approval of the authority of conducting the course of study

The course of regular academic study prescribed under regulation 7 shall be conducted in an institution, approved by the Pharmacy Council of India under sub-section(1) of Section 12 of the Pharmacy Act, 1948 & VMRF(DU)

10. Examination

There shall be an examination for Diploma in Pharmacy (Part-I) to examine the students of the first year and an examination for Diploma in Pharmacy (Part-II) to examine the students of the second year course. Each examination may be held twice every year. The first examination in a year shall be the annual examination and the second examination shall be the supplementary examination of the Diploma in Pharmacy (Part-I) or Diploma in Pharmacy (Part-II), as the case may be. The examinations shall be of written and practical (including oral) nature, carrying maximum marks for each part of a subject, as indicated in Table III and IV below

TABLE-III

DIPLOMA IN PHARMACY (PART- I) EXAMINATION

Subject	Maximum marks for Theory			Maximum marks for practical		
	Examination	*Sessional	Total	Examination	Sessional	Total
Pharmaceutics-I	80	20	100	80	20	100
Pharmaceutical Chemistry-I	80	20	100	80	20	100
Pharmacognosy	80	20	100	80	20	100
Biochemistry & Clinical Pathology	80	20	100	80	20	100
Human Anatomy & Physiology	80	20	100	80	20	100
Health Education & Community Pharmacy	80	20	100	-	-	-
			600 +		500 = 1100	

* Internal assessment

TABLE-IV

DIPLOMA IN PHARMACY (PART-II) EXAMINATION

Subject	Maximum marks for Theory			Maximum marks for practical		
	Examination	*Sessional	Total	Examination	Sessional	Total
Pharmaceutics-II	80	20	100	80	20	100
Pharmaceutical Chemistry-II	80	20	100	80	20	100
Pharmacology&Toxicology	80	20	100	80	20	100
Pharmaceutical Jurisprudence	80	20	100	-	-	-
Drug store & Business Management	80	20	100	-	-	-
Hospital & Clinical Pharmacy	80	20	100	80	20	100
			600 +		400 = 1000	

* Internal assessment

11. Eligibility for appearing at the Diploma in Pharmacy Part-I Examination:

Only such candidates who produce certificate from the Head of the academic institution in which he/she has undergone the Diploma in Pharmacy Part-I course, in proof of his/her having regularly and satisfactorily undergone the course of the study by attending not less than 75% of the classes held both in theory and in practical separately in each subject shall be eligible for appearing at the Diploma in Pharmacy (Part-I) examination.

12. Eligibility for appearing at the Diploma in Pharmacy Part-II Examination:

Only such candidates who produce certificate from the Head of the academic institution in which he/she has undergone the Diploma in Pharmacy Part-II course, in proof of his/her having regularly and satisfactorily undergone the Diploma in Pharmacy Part-II course by attending not less than 75% of the classes held both in theory and in practical separately in each subject shall be eligible for appearing at the Diploma in Pharmacy (Part-II) examination.

13. Mode of Examinations

a. Each theory and practical examination in the subject mentioned in Table III and IV shall be of three hours duration.

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

c. Practical examination shall also consist of a viva – voce (Oral) examination.

14. Award of sessional marks and maintenance of records

a. 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 Diploma in Pharmacy Part-II courses, shall be maintained for each student in the institution 20 marks for each theory and 20 marks for each practical subject shall be allotted as sessional.

b. There shall be at least three periodic sessional examinations during each academic year. The highest aggregate of any two performances shall form the basis of calculating sessional marks.

c. The sessional marks in practical shall be allotted on the following basis:
   i. Actual performance in the sessional examination –10 Marks.
   ii. Day to day assessment in the practical class work.- 10 Marks.

15. Minimum marks for passing the examination

A student shall not be declared to have passed Diploma in Pharmacy examination unless he/she secures at least 50% marks in each of the subject separately in the theory examinations, including sessional marks and at least 50% 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 first class in Diploma in Pharmacy (Part-I) or Diploma in Pharmacy (Part-II) examinations 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 the subject or those subjects provided he/she passes in all the subjects in single attempt.

16. **Eligibility for promotion to Diploma in Pharmacy**

All candidates who have appeared for all the subjects and passed the Diploma in Pharmacy Part-I examination are eligible for promotion to the Diploma in Pharmacy Part-II class. However, failure in more than two subjects shall debar him/her from promotion to the Diploma in Pharmacy part-II class.

17. **Improvement of sessional marks**

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 practical shall be improved by appearing in additional practical examinations. Marks awarded to a candidate for day to day assessment in the practical class can not be improved unless he/she attends a regular course of study again.

18. Approval of examinations

The examinations mentioned inregualtions 10 to 13 and 15 shall be held by an authority hereinafter referred to as the Examining Authority , VMRF(DU) which was approved by the Pharmacy Council of India under sub-section (2) of Section 12 of the Pharmacy Act , 1948.

19. **Certificate of passing examination for Diploma in Pharmacy (Part-II)**

Certificate of having passed the examination for the Diploma in Pharmacy Part-II shall be granted by the examining Authority to a successful student.

CHAPTER III
Diploma in Pharmacy (Part-III) Practical Training

20. Period and other conditions of Practical Training

1.After having appeared in Part=-II examination of Diploma in Pharmacy conducted by board / university or other approved examination body or any other course accepted as being equivalent by the pharmacy council of India, a candidate shall be eligible to undergo practical training one or more of the following institution namely:

i. Hospital /dispensaries run by central / state government/ municipal corporation/central government health scheme and employees state insurance scheme.

ii. A pharmacy, chemist and druggist licensed under the drugs and cosmetics act, 1940 & rules made there under.

2. The institution referred in sub-regulation (1) shall be eligible to impart training subject to th condition that the number of student pharmacists that may be taken in any hospital, pharmacy, chemist and druggist and drug manufacturing unit licensed under the drugs and cosmetics rules, 1945 made under the drugs and cosmetics act , 1940 shall not exceed two where there is one registered pharmacist engaged in the wok in which the student pharmacist is under going practical training, where there is more than one registered pharmacist similarly engaged , the number shall not exceed one for each additional such registered pharmacist .

3. Hospital and dispensary other than those specified in sub regulation (1) for the purpose of giving practical training shall have to be recognized by pharmacy council of India on fulfilling the condition specified in Appendix D to these regulation

4. In the course of practical training, the training shall have exposure to :

i. Working knowledge of keeping of records required by various acts concerning the profession of pharmacy; and

ii. Practical experience in:

1. The manipulation of pharmaceutical apparatus in common use.
2. The reading, translation and copying of prescription including checking of doses;
3. The dispensing of prescription illustrating the commoner methods of administering medicaments; and
4. The storage of drugs and medical preparations.

5. The practical training shall not be not less than five hundred hours spread over a period of not less than three months, provided that not less than two hundred and fifty hours are devoted to actual dispensing of prescriptions.

21. Procedure to be followed prior to commencing of the training:

a. The head of an academic training institution, on application, shall supply in triplicate ‘prcatical training contract form for qualification as a pharmacist’ (hereafter referred to as the contract form) to a candidate eligible to undertake the said practical training. The contract form shall be as specified in Appendix – E to these regulations.

b. The Head of an academic training institution shall fill section – I of the Contact Form. The trainee shall fill section II of the said Contract Form and the Head of the institution agreeing to impart the training (here in after referred to as the Apprentice Master) shall fill section III of the said Contract Form.

c. It shall be the responsibility of the trainee to ensure that one copy (hereinafter referred t as the first copy of the Contract Form) so filled is submitted to the Head of the academic training institution and the other tow copies (hereinafter referred to as the second copy and the third copy) shall be filed with the Apprentice Master (if he so desires) or with the trainee pending completion of the training.

22. **Certificate of passing Diploma in Pharmacy (Part –III):**

On satisfactory completion of the apprentice period, the Apprentice Master shall fill Section IV of the second copy and third copy of the Contract Form and cause it to be sent to the Head of the academic training institution 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 hand over both the second copy and 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)

CHAPTER IV

23. **Certificate of Diploma in Pharmacy**:

A certificate of Diploma in Pharmacy shall be granted by the Examining Authority to a successful candidate on producing certificate of having passed the Diploma in Pharmacy Part –I and Part – II and satisfactory completion of practical training for Diploma in Pharmacy (Part – III).

24. **Miscellaneous**:

No course of training in Pharmacy shall be considered for approval under regulation 18 unless it satisfies all the conditions prescribed under these regulation

25. Repeal and Savings:

(1) The Education Regulations, 1981 (hereinafter referred to as the said regulations) published by the Pharmacy Council of India vide No.14-55/79-Pt.I/PCT/4235 – 4650 Dt. 8th July.1981 is hereby repealed.

(2) Not withstanding such repeal,-

i. anything done or any action taken under the said regulations shall be deemed to have been done or taken under the corresponding provisions of these regulations.

ii. a person who was admitted as a student under the said regulations to the course of training for Diploma in Pharmacy and who had not passed the examinations at the commencement of these regulations shall be required to pass the examination in accordance with the provisions of the said regulations as if these regulations had not come into force:

Provided, however, the Examining Authority in a particular State may fix a date after which the examinations under the said Regulations shall not be conducted.

SYLLABUS
I YEAR

1.1. PHARMACEUTICS-I

THEORY **75 HRS**

1) Introduction of different dosage forms. Their classification with example-their relative applications. Familiarization with new drug delivery systems.. - 4 Hrs
2) Introduction to pharmacopoeias with special reference the Indian pharmacopoeia.- 2 Hrs
3) Metrology-systems of weights and measures. Calculations including conversion from one to another system. Percentage calculations and adjustment of products. Use of allegation method in calculations. Isotonic solutions. - 4 Hrs
4) Packing 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 Hrs
5) Size reduction-Objectives and factors affecting size reduction, methods of size reduction –Study of hammer mill, Ball mill. Fluid energy mill and disintegrator. - 5 Hrs
6) Size separation –size separation by sifting. Official standards for powders. Sedimentation methods of size separation. Construction and working of cyclone separator. - 4 Hrs

7) Mixing and homogenization-liquid mixing and powder mixing, mixing of semisolids. Study of Silversonmixer– homogeniser, "planetary mixer: colloid mill and hand homogeniser. double cone mixer. - 5 Hrs

8) Clarification and filtration –theory of filtration, filter media: filter aids and selection of filters. Study of the following filtration equipment-filter press, sintered filters, filter candles, meta filter.- 6 Hrs

9) Extraction and galenicals –(a) study of percolation and maceration and their modifications, continuous hot extraction. Application in the preparation of tinctures and extracts. (b) introduction to ayurvedic dosage forms. - 5 Hrs

10) Heat processes-evaporation-definition, factors-affecting evaporation. Study of evaporating still and evaporating pan. - 4 Hrs

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. - 5 Hrs

12) Introduction to drying processes-study of Tray Dryers: Fluidized Bed Dryer, Vacuum Dryer and Freeze Dryer. - 4 Hrs

13) Sterilization – Concept of sterilization and its difference from disinfection. Thermal resistance of microorganisms. Detailed study of the following sterilization processes:
    i. Sterilization with moist heat:
    ii. Dry heat sterilization:
    iii. Sterilization by radiation:
    iv. Sterilization filtration; and
    v. Gaseous sterilization. - 6 Hrs

Aseptic techniques-Application of sterilization processes in hospitals particularly with reference of surgical dressings and intravenous fluids. Precautions for safe and effective handling of sterilization equipment.

14) Processing Tablets-Definition, different types of compressed tablets and their properties; processes involved in the production of tablets; tablets excipients; defect in tablets; evaluation of tablets; physical standards including disintegration and dissolution. Tablet coating-sugar coating: film coating; enteric coating and micro encapsulation (Tablet coating may be dealt in an elementary manner. - 5 Hrs

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. - 5 Hrs

16) Study of immunological products like sera, vaccines, toxoids and their preparations.- 6 Hrs

PRACTICAL 100 HRS

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

1)	Aromatic waters	3	- 6 Hrs
2)	Solutions	4	- 6 Hrs
3)	Spirits	2	- 6 Hrs
4)	Tinctures	4	- 8 Hrs
5)	Extracts	2	- 12 Hrs
6)	Creams	2	- 10 Hrs
7)	Cosmetic preparations	3	- 12 Hrs
8)	Capsules	2	- 8 Hrs
9)	Tablets	2	- 8 Hrs
10)	Ophthalmic preparations	2	- 8 Hrs
11)	Preparations involving aseptic techniques	2	- 10 Hrs
12)	Preparations involving sterlization	2	- 6 Hrs

REFERENCE BOOKS

1) Remington's Pharmaceutical Sciences.
2) Martindale The extra Pharmacopoeia
3) Pharmaceutics -I - P.V.Kasture S.B.Parakh.
4) Pharmaceutics – I - Ramakrishnan Palanisamy.
5) Introduction to Pharmaceutics –I - Ashok.K.Guptha.
6) Pharmaceutics –I - R.M.Metha
7) Pharmaceutics –I - Venugopal.
8) Tata's Pharmaceutics –I Nirmal Sharma & Yogeswar Sharma.

1.2. PHARMACEUTICAL CHEMISTRY – I **75 hrs**

THEORY

1) General discussion on the following inorganic compounds including important physical and chemical properties, medicine 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. - 5 Hrs
   b. Antioxidants- hypophosphorous acid, sulphur dioxide, sodium bisulphate, sodium meta-bisulphite, sodium thiosulphate, nitrogen and Sodium nitrite. - 6 Hrs
   c. Gastrointestinal agents - 10 Hrs
      i. Acidifying agent –Dilute hydrochloric acid;
      ii. Antacids- sodium bicarbonate. Aluminium hydroxil gel, Magnesium carbonate, Aluminium phosphate, calcium 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 - 9 Hrs
      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, sodium meta phosphate, dicalcium phosphate, strontium chloride, zinc chloride. - 4Hrs
   f. Inhalants-Oxygen, carbon dioxide, nitrous oxide. - 2Hrs
   g. Respiratory stimulants- Ammonium carbonate. - 1Hr
   h. Expectorants and Emetics- Ammonium chloride, Potassium iodide, Antimony potassium tartrate. - 1 Hr
   i. Antidotes - sodium nitrite. - 1 Hr

2.Major Intra and Extra –Cellular Electrolytes

   a. Electrolytes used for replacement therapy- Sodium chloride and its preparations, Potassium chloride and its preparations. - 5 Hrs
   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. - 5 Hrs
   c. Combination of oral electrolyte powders and solutions. - 5 Hrs

3. Inorganic official compounds of Iron, Iodine and Calcium ferrous sulfate and calcium gluconate. - 5 Hrs
4. Radio pharmaceuticals and contract media –radio activity alpha. Beta and Gamma radiations, biological effects of radiation. measurement of radio Activity G.M. Counter. Radio isotopes –their uses, storage and precautions with special reference to the official preparations. Radio opaque contract media –Barium sulfate. - 6 Hrs
5. Quality control of Drugs and Pharmaceuticals-importance of quality control, significant errors, methods used for quality control, sources of impurities in pharmaceuticals. Limits tests for arsenic, chloride, sulfate, iron and heavy metals. - 5 Hrs
6. Identification tests for cations and anions as per Indian Pharmacopoeia. - 5 Hrs

PRACATICALS **75 HRS**

1. Identification tests for inorganic compounds particularly drugs and pharmaceuticals.- 12 Hrs
2. Limit test for chloride, sulfate, arsenic, iron and heavy metals. - 21 Hrs
3. Assay of inorganic pharmaceuticals involving each of the following methods of compounds marked with (*) under theory.
   a. Acid –base titration's (at least 3) - 12 Hrs
   b. Redox titrations (one each of permanganometry and idimetry). - 9Hrs
   c. Precipitations titrations (Calcium andmagnesium) - 9 Hrs
   d. Complexometric titration (Calcium and magnesium) - 12 Hrs

REFERENCE BOOKS

i. Practical Pharmaceutical Chemistry - A.H. BECKETTE AND J.B. STANLAKE
ii. Inorganic Medicinal and Pharmaceutical Chemistry - Block, ROCKHE, SOLNE, WILSON.
iii. Text book of Inorganic Chemistry - P.L. SONI.
iv. Pharmaceutical Inorganic Chemistry - DISCHER.
v. Pharmaceutical Chemistry - M.L.SCHROFF.
vi. Pharmaceutical Chemistry - BENTLEYAND DRIVER.
vii. Advanced Inorganic Chemistry - G.R.CHATWA.
viii. Indian Pharmacopoeia.

1.3 PHARMACOGNOSY

THEORY **75 HRS**

1. Definitions, history and scope of pharmacognosy including indigenous system of medicine. - 3 Hrs
2. Various system of classification of drugs of natural origin. - 3 Hrs
3. Adulteration and drug evaluation; significance of pharmacopoeial standards. - 4 Hrs
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. - 3 Hrs
5. Occurrence, distribution, organoleptic evaluation, chemical constituents including tests wherever applicable and therapeutic efficacy of following categories of drugs. - 42 Hrs
   a. Laxatives – Aloes, Rhuburb, 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-Catechu.
   e. Drugs acting on nervous system- Hyoscyamus, Belladonna, Aconite, Ashwagndha, Ephedra, Opium, Cannabis, Nux vomica.
   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. Anti dysenterics – Ipecacuanha.
n. Antiseptics and disinfectants – Benzoin, Myrrha, Nim, Curcuma.
o. Antimalarials –Cinchona.
p. Oxytocics – Ergot
q. Vitamins- 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 oil.
t. Pharmaceutical aids- Honey, Arachis oil, Starch, Kaolin, Pectin, Olive oil, Lanolin, Beeswax, Acacia, Tragacanth, Sodium Alginate, Agar, Guargum, Gelation.
u. Miscellaneous – Liquorice, Garlic, Picrorhiza, Dioscorea, Linseed, Shatavari, Shankhupushpi, Pyrethrum, Tobacco.

6. Collection and preparation of crude drugs for the market as exemplified by Ergot, Opium, Rauwolfia, Digitalis, Senna. - 5 Hrs
7. Study of source, preparation and identification of fibres used in sutures and surgical dressings- cotton, silk wool and regenerated fibres - 5 Hrs
8. Cross anatomical studies of – Senna, Datura, Cinnamom, Chinhona, Fennel, Clove, Ginger, Nuxvomica and Ipecacuanha. - 10 Hrs

PRACTICALS 75 HRS

1. Identification of drugs by morphological characters. - 15 Hrs
2. Physical and chemical tests for evaluation of drugs wherever applicable. - 21 Hrs
3. Cross anatomical studies (t.s) of the following drugs-Senna, Dautra, Cinnamon, Cinchona, Coriander, Fennel, Clove, Ginger, Nuxvomica, Ipecacuanha. - 30 Hrs
4. Identification of fibres and surgical dressings. - 9 Hrs

REFERENCE BOOKS

1. Pharmacognosy - G.E.Trease & W.C.Evans ELBS.
2. Text book of Pharmacognosy - T.E.Wallis, CBS Pub., Delhi.
3. Practical Pharmacognosy - Dr.C.K. Kokate.
4. Pharmacognosy Question Bank – Dr.M.A.Iyangar.
5. Powdered Crude Drugs - Dr.M.A. Iyangar.
6. Practical Pharmacognosy – Dr.P.K.Lala.
7. Pharmacognosy – S.S.Handa & V.K. Kapoor, Valabh Prakashan, Delhi.
8. Pharmacognosy - G.E.& W.C. Evans, ELBS,

1.4 BIOCHEMISTRY & CLINICAL PATHOLOGY

THEORY **50 HRS**

1. Introduction of biochemistry. - 2 Hrs
2. Brief chemistry and role of proteins, polypeptides and aminoacids, classification, qualitative tests, biological value, deficiency diseases. - 6 Hrs
3. Brief chemistry and role of carbohydrates. Classification, qualitative tests. Diseases related to cabohydrate metabolism. - 7 Hrs
4. Brief chemistry and role of Lipids. Classification, qualitative tests. Diseases related to lipids metabolism. - 7 Hrs
5. Brief chemistry and role of vitamins and Coenzymes. - 8 Hrs

6. Role of minerals and water in life processes - 3 Hrs
7. Enzymes: Brief concepts of enzymic action. Factors affecting it. Therapeutic and pharmaceutical importance. - 3 Hrs
8. Brief concepts of normal and abnormal metabolism of proteins, carbohydrates and lipids. - 6 Hrs
9. Introduction to pathology of blood and urine . - 8 Hrs
   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.

PRACTICALS **75 HRS**

1. Detection and identification of proteins, amino acids, carbohydrates and lipids. - 39 Hrs
2. Analysis of normal and abnormal constituents of blood and urine (Glucose, Urea, Creatinine, Creatine, Cholesterol, alkaline phosphatase, Bilirubin, SGPT, SGOT, Calcium, Diastase, Lipase). - 18 Hrs
3. Examination of sputum and faeces (microscopic and staining). - 9 Hrs
4. Practice in injecting drugs by intramuscular, subcutaneous and intravenous routes. Withdrawal of blood samples. - 9 Hrs

REFERENCE BOOKS

1. Biochemistry - Zuby.
2. Principles of biochemistry - Lehninger.
3. A text book of biochemistry- Rama Rao.
4. Biochemistry – Trehan
5. Fundamental of Biochemistry – Deb.
6. Practical and clinical biochemistry – Varley
7. Biochemistry and clinical pathology- Chaudhari & Gokale.
8. Biochemistry - Gundu Rao
9. Medical biochemistry- Rama Rao.
10. Biochemistry – Stryer
11. Fundamental of biochemistry for medical students – Ambika Shanmugam.
12. Principles of biochemistry – Racon & Strimedur.
13. Biochemistry – Davidson & Sittman.
14. Principles of medical biochemistry – Meisenberg & Simmons.
15. Harper's biochemistry – Murrey and Granner.

1.5 HUMAN ANATOMY & PHYSIOLOGY

THEORY **75 HRS**

1. Scope of anatomy and physiology. Definition of various terms used in anatomy. – 2 Hrs
2. Structure of cell, function of its components with special reference to mitochondria and microsomes. - 4 Hrs
3. Elementary tissues of the body, i.e. epithelial tissue, muscular tissue, connective tissue and nervous tissue. - 4 Hrs
4. Structure and function of skeleton. Classification of joints and their function, joint disorder. - 6 Hrs
5. Composition of blood, functions of blood elements. Blood group and coagulation of blood. Brief information regarding disorders of blood. - 9 Hrs
6. Name and function of lymph glands. - 2 Hrs

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 in formation about cardiovascular disorders. - 9 Hrs
8. Various parts of respiratory system and their functions. Physiology of respiration. - 5 Hrs
9. Various parts of urinary systems and their functions, Structure and functions of kidney. Physiology of urine formation. Pathophysiology of renal diseases and oedema. - 5 Hrs
10. Structure of skeletal muscle. Physiology of muscle contraction, names, positions, attachments and functions of various skeletal muscles. Physiology of neuromuscular junction. - 3 Hrs
11. Various parts of central nervous system, brain and its parts, functions and reflex action. Anatomy and physiology of autonomic nervous system. - 7 Hrs
12. Elementary knowledge of structure and functions of the organs of taste, smell, ear, eye and skin. Physiology of pain. - 3 Hrs
13. Digestive system. Names of the various parts of digestive system and their functions. Structure and functions of liver, physiology of digestion and absorption. - 7 Hrs
14. Endocrine glands and hormones. Location of the glands, their hormones and functions. Pituitary, Thyroid, Adrenal and Pancreas. - 7 Hrs
15. Reproductive system – physiology and anatomy of reproductive system. - 2 Hrs

PRACTICAL **50 HRS**

1. Study of the human skeleton. - 10 Hrs
2. Study with the help of charts and models of the following systems and organs. - 8 Hrs
    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. - 6 Hrs
4. Examination of blood films for TLC, DLC, and malarial parasite. - 9 Hrs
5. Determination of clotting time of blood, erythrocyte sedimentation rate and hemoglobin value. - 9 Hrs
6. Recording of body temperature, pulse, heart rate, blood pressure and ECG. - 8 Hrs

REFERENCE BOOKS

2. Human Physiology (Vol. I) - Chandi Charan Chatterjee, Medical Allied Agency, Calcutta.
3. Human Physiology (Vol. II) - Chandi Charan Chatterjee, Medical Allied Agency, Calcutta.
4. Best & Taylor's Physiological Basis of Medical Practice II Edition-John B West, M.D., Ph.D. (Williams & Wikkins Baltimore)/ London.
5. Physiological of the Human body - C.Guyton, M.D.Saunders college publishing Holt- Saunders Japan.
6. Human Physiology by Chakrabarti, Ghosh & Sahana, The new book stall Calcultta.
7. Text book of Preventive and Social Medicine - J.E. Park
8. Social and Preventive Medicine - Yashpal Bedi Atma Ram & Sons Delhi-6
9. Medical Laboratory Technology - Dr.Ramnik Sood M.D. Jaypee Brothers.

1.6 HEALTH EDUCATION AND COMMUNITY PHARMACY THEORY 50 HRS

1. Concepts of health – Definition of physical health, mental health, social health, spiritual health, determination of health indicators, concept of disease, natural history of disease , the disease agents. Concepts of prevention of diseases. - 7 Hrs
2. Nutrition and health - Classification of foods. Requirements, diseases induced due to deficiency of proteins, vitamins and minerals treatment and prevention. - 4 Hrs
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. - 5 Hrs
4. First aid – Emergency treatment in shock, snake-bite, burns, poisoning, heart disease, fractures and resuscitation methods. Elements of minor surgery and dressings. - 3 Hrs
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 Hrs
6. Fundamental principles of microbiology classification of microbes, isolation, straining techniques of organisms of common diseases. - 3 Hrs
7. Communicable diseases- causative agents, mode of transmission and prevention.
   a. Respiratory infections- chicken pox, measles, influenza, diphtheria, whooping cough and tuberculosis. - 2 Hrs
   b. Intestinal infections- poliomyelitis, hepatitis, cholera, typhoid, food poisoning, hookworm infection. - 2 Hrs
   c. Arthropod borne infections-Plague, malaria, filariasis. - 2 Hrs
   d. Surface infections-Rabies, trachoma, tetanus, leprosy. - 2 Hrs
   e. Sexually transmitted diseases- Syphilis, gonorrhoea, AIDS. - 2 Hrs
8. Non-communicable diseases – Causative agents, prevention, care and control: Cancer, diabetes, blindness, cardiovascular diseases. - 3 Hrs
9. Epidemiology – its scope, methods, uses, dynamics of disease transmission, Immunity and immunization: Immunological products and their dose schedule. Principles of disease control and preventions, hospital acquired disinfections prevention and control. Disinfections, types of disinfections, procedures, for faces, urine, sputum, room, linen, dead-bodies, instruments. - 9 Hrs

REFERENCE BOOKS

1. Health Education and Community Pharmacy – Bothara & Kahndelwal.
2. Health Education & Community Pharmacy – Dandiya, Zafar.
3. Health Education & Community Pharmacy- Murugesh.
4. Park's Text book of Preventive and social medicine – K.Park.
5. Basics of Health education & community Pharmacy- Ramesh .K.Loyal, Purloop.A.
6. Bhatt, Pradeep Kumar.

YEAR II

2.1 PHARMACEUTICS – II

THEORY **75 HRS**

1. Dispencing 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. - 4 Hrs

II. Incompatibilities in prescriptions- Study of various types of incompatibilities – physical, chemical and therapeutic. - 6 Hrs

III. Posology – dose and dosage of drugs. Factors influencing dose. Calculations of doses on the basis of age, sex and surface area. Veterinary doses. - 6 Hrs

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 highlighted).

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 amount and weighing of a material below the minimum weighable amount, geometric dilution and proper usage and care of dispensing balance. - 4 Hrs

ii. Liquid Oral Dosage Forms

a. Monophasic - 6 Hrs

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 Mucas Membranes

Mixtures and concentrates
Syrups
Elixirs
Gargles
Mouth washes
Throat-paints
Douches
Ear drops
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. - 6 Hrs

ii. **Emulsions**

Types of emulsions, identification of emulsion systems, formulation of emulsions, selection of emulsifying agents. Instabilities in emulsions, Preservation of emulsions. - 6 Hrs

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. - 4 Hrs

b. Pastes-Differences between ointments and pastes. Bases of pastes. Preparation of pastes and their preservation. - 3 Hrs

c. Jellies-An introduction to the different types of jellies and their preparation. - 1 Hr

d. Poultices-An elementary study of poultice - 1 Hr

e. Suppositories and pessaries-Their relative merits and demerits, types of susppositories, suppository bases, classification, properties. Preparation and packing of suppositories. Use of suppositories for drug absorption.- 4 Hrs

iv. Dental and Cosmetic Preparations

Introduction to Dentifrices, Facial cosmetics, Deodorants, Antiperspirants, Shampoos, Hair dressings and Hair removers. - 10 Hrs **v. Sterile Dosage Forms**

a. Parenteral dosage forms- Definition, general requirements for parenteral dosage forms. Types of parenteral formulations, vehicles, adjutants, processing, personnel, facilities and quality control. Preparation of intravenous fluids and admixtures-Total parenteral nutrition, Dialysis fluids. - 6 Hrs

b. Sterility testing, particulate matter monitoring. Faulty seals, packaging. - 4 Hrs

c. Ophthalmic Products – Study of essential characteristics of different ophthalmic preparations. - 4 Hrs

Formulation additives, special precautions in handling and storage of ophthalmic products.

PRACTICALS **100 HRS**

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 prescription etc.

REFERENCE BOOKS

1. Pharmaceutics –II - R.M.Metha
2. Pharmaceutics-II - C.Ramasamy.
3. Ramakrishnan Palanisamy, Pharmaceutics-II.
4. Tata's Pharmaceutics-II Anees ahmed Siddiqui & Sharma.
5. Pharmaceutics -II A.K.Seth.
6. Pharmaceutics-II P.V.Kasture , S.R.Parakh : S.B.Gokhale A.N.Paradkar.
7. Practical Pharmaceutics-II P.IV.Kasture, S.R.Parakh, S.B .Gokale , A.P.Paradkar.

2.2 PHARMACEUTICAL CHEMISTRY II

THEORY **75 Hrs**

1. Introduction to the nomenclature of organic chemical systems with particular reference to heterocyclic system containing upto 3 rings. - 3 Hrs

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.

- 3 Hrs

Antiseptics and Disinfectants-Proflavine*, Benzalkonium chloride, Cetrimide, Chlorocresol*, Chloroxylenol, Formaldehyde solution. Hexachlorophene, Liquified phenol, Nitrofurantion.

Sulfonamides-Sulfadiazine*, Sulfaguanidine*, Phthalyl sulfathiazole, Succinyl sulfathiazole, Sulfadimenthoxine, - 1 Hr

Sulfamethoxy pyridazine, Sulfa methoxazole, co-trimoxazole, Sulfa-acetamide*. - 3 Hrs

Antileprotic Drugs-Clofazimine, Thiambutosine, Dapsone*, Solapsone. - 2 Hrs

Anti-tubercular Drugs-Isoniazid*, PAS*, Streptomycin, Rifampicin Ethambutol*, Thiacetazone, Ethionamide, Cycloserine, Pyrazinamide*. - 3 Hrs

Antiamoebic and Anthelmintic Drugs-Emetine, Metronidazole*, Halogenated hydroxyquinolines, Diloxanidefuroate, Paramomycin Piperazine*, Mebendazole, D.E.C.*. - 4 Hrs

Antibiotics-Benzyl Penicillin*, Phenoxy methyl Penicillin*, Benzathine Penicillin, Ampicillin*, Cloxacillin, Carbenicillin, Gentamycin, Neomycin, Erythromycin, Tetracycline, Cephalexin, Cephaloridine, Cephalothin,
Griseofulvin, Chloramphenicol. - 5 Hrs

Antifungal agents-Undecylenic acid, Tolnaftate, Nystatin, Amphoterecin, Hamycin. - 2 Hrs

Antimalarial Drugs-Chloroquine*, Amodiaquine, Primaqunie, Proguanil, Pyrimethamine, Quinine, Trimethoprim. - 3 Hrs

Tranquillizers-Chlorpromazine*, Prochlorperazine, Trifuloperazine, Thiothixene, Haloperidol*, Triperodol, Oxypertine. Chlordiazepoxide, Diazepam*, Lorazepam, Meprobamate. - 3 Hrs

Hypnotics-Phenobarbitone*, Butabarbitone, Cyclobarbitone, Nitrazepam, Gluethimide*, Methyprylon, Paraldehyde, Trichlofs sodium. - 4 Hrs

- 3 Hrs

General Anaesthtics-Halothane*, Cyclopropane*, Diethylether*, Methohexital sodium, Thiopental sodium, Trichloro ethylene.

Antidepressant Drugs-Amitriptyline Nortryptyline, Imipramine*, Phenelzine, Tranylcypromine. - 1 Hr

Analeptics-Theophylline, Caffeine*, Coramine*, Dextroamphetamine. - 1 Hr

Adrenergic Drugs- Andrenaline*, Noradrenaline, Isoprenaline*, Phenylephrine, Salbutamol, Terbutaline, Ephedrine*, Pseudoephedrine. - 2 Hrs

Adrenergic Antagonist-Tolazoline, Propranolol*, Practolol, Cholinergic Drugs-Neostigmine*, Pyridostigmine, Pralidoxime, Pilocarpine, Physostigmine*. - 2 Hrs

Cholinergic Antagonists-Atropine*, Hyoscine, Homatropine, Propantheline*, Benztropine, Tropicamide, Biperiden*. - 2 Hrs

Diuretic Drugs-Furosemide*, Chlorothiazide, Hydrochlorothiazide*, Benzthiazide, Urea*, Mannitol*, Ethacrynic Acid. - 2 Hrs

Cardiovascular Drugs-thyl nitrite*, Glyceryl trinitrate, Alpha methyldopa, Guanethidine, Clofibrate, Quinidine. - 2 Hrs

Hypoglycemic Agents-Insulin, Chlorpropamide*, Tolbutamide Glibenclamide, Phenformin*, Metformin. - 2 Hrs

Coagulants and Anti-Coagulants-Heparin, Thrombin, Menadione*, Bishydroxycoumarin, Warfarin Sodium. - 2Hrs

Local Anaesthetics-Lignocaine*, Procaine*, Benzocaine. - 1Hr

Histamine and Anti histaminic Agents-Histamine Diphenhydramine*, Promethazine, Cyproheptadine, Mepyramine, Pheniramine, Chlorpheniramine*. - 2 Hrs

Analgesics and Antipyretics-Morphine, Pethidine*, codeine, Methadone, Aspirin*, Paracetamol*, Analgin, Dextropropoxyphene, Pentazocine. - 2 Hrs

Non Steroidal anti inflammatory Agents-Indomethacin*, Phenylbutazone*, Oxyphenbutazone, Ibuprofen. - 1 Hr

Thyroxine and Antithyroids-Thyroxine*, Methimazole, Methylthiouracil, Propylthiouracil. - 1 Hr

- 3 Hrs

Diagnostic Agents – Iopanoic Acid, Propyliodone, Sulfobromophthalein, Sodium, Indigotindisulfonate, Indigo Carmine, Evans blue, Congo Red, Fluoresein Sodiun.

- 4 Hrs

Anticonvulsants, Cardiac glycosides, Antiarrhythmic, antihypertensives and vitamins.

Steroidal Drugs-Betamethason, Cortisone, Hydrocortisone, Prednisolone, Progesterone, Testosterone, Oestradiol, Nandrolone. - 2 Hrs

- 4 Hrs

Antineoplastic Drugs-Actinomycins, Azathioprine Busulphan, Chlorambucil Cisplatin, cyclophosphamide, Daunorubicin, Hydrochloride, Fluorouracil, Mercaptopurine, Methotrexate, Mitomycin.

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). - 33 Hrs - 27 Hrs
2. Official identification tests for certain groups of drugs included in the I.P. like barbiturates, sulfonamides, phenothiazines, antibiotics etc. (8 compounds). - 14 Hrs
3. Preparation of three simple organic preparations.

REFERENCE BOOKS

1. Bentley and Drivers text book of Pharmaceutical Chemistry - L.M.Atherden.
2. Principles of Medicinal Chemistry - William .O.FOYE.
3. Principles of Medicinal Chemistry - Kadam, K.R.Mahadik & Bothara.
4. Pharmaceutical Chemistry – II - V.N.Rajasekar.
5. Pharmaceutical Chemistry- Allen Chidambaram.
6. Willson and Gisvold's text book of Organic Medicinal and Pharmaceutical Chemistry by Jaime N. Delgado And William A. Remers.
7. Text book of Medicinal Chemistry - P. Primod.
8. Practical Pharmaceutical Chemistry - Beckett & J.B. Stenlake.

2.3 PHARMACOLOGY & TOXICOLOGY

THEORY **75 HRS**

1. Introduction to pharmacology, scope of pharmacology. - 2 Hrs
2. Routes of administration of drugs, their advantages and disadvantages. - 2 Hrs
3. Various processes of absorption of drugs and the factors affecting them. Metabolism, distribution and excretion of drugs. - 3 Hrs
4. General mechanism of drugs action and the factors which modify drugs Action. - 2 Hrs
5. Pharmacological classification of drugs. The discussion of drugs should emphasise the following aspects :

I. Drugs acting on central nervous system :

a. General anaesthetics, adjunction to anaesthesia, intraveuous anaesthetics. - 2 Hrs

b. Analgesic and non-steroidal anti-inflammatory drugs, Narcotic analgesics. Antirheumaticandantigoutremedies.SedativesandHypnotics, Psychopharmacological agents, Anti-convulsants, analeptics. - 8 Hrs

c. Centrally acting muscle relaxants and antiparkinsonism agents.- 2 Hrs

ii. Local Anaesthetics - 1 Hr

iii. Drugs acting on autonomic nervous system

a.Cholinergic drugs, anticholinergic drugs, anticholinesterase drugs. - 2 Hrs

b. Adrenergic drugs and adrenergic receptor blockers. - 2Hrs

c. Neurone blockers and ganglion blockers. - 2Hrs

d. Neuromuscular blockers, drugs used in myasthenia gravis - 2Hrs

iv. Drugs acting on eye, mydriatics, drugs used in glaucoma - 1Hr

v. Drugs acting on respiratory system- respiratory stimulants, Bronchodilators, Nasal decongestants, expectorants and antitussive agents. - 4 Hrs

vi. Antacids, Physiological role of histamine and serotonin, Histamine and Antihistamines, Prostaglandins. - 4 Hrs

vii. Cardiovascular drugs, Cardiotonics, Antiarrhythmic agents, Antianginal agents, Antihypertensive agents, Peripheral vasodilators and drugs used in atherosclerosis. - 7 Hrs

viii. Drugs acting on the blood and blood forming organs. Haematinics, Coagulants ands anticoagulants, Haemostatics, Blood substitutes and plasma expanders - 4Hrs.

ix. Drugs effecting renal function-Diuretics and antidiuretics. - 2Hrs

x. Hormones and hormone antagonists-Hypoglycemic agents, Antithyroid drugs, sex hormones and oral contraceptives, corticosteriods. - 5 Hrs

xi. Drugs acting on digestive system-Carminatives, digestants, bitters, antacids and drugs used in peptic ulcer, Purgatives and laxatives, antidiarrhoeals, antispasmodics. - 5 Hrs

1. Chemotherapy of microbial disease-Urinary antiseptics, Sulphonamides, Penicillins, Streptomycin, Tetracyclines and other antibiotics. Antitubercular agents, antifungal agents, antiviral drugs, antileprotic drugs. - 8Hrs
2. Chemotherapy of protozoal disease. Anthelmintic drugs. - 2Hrs
3. Chemotherapy of cancer - 2Hrs
4. Disinfectants and antiseptics - 1Hr

A detailed study of the action of drugs on each organ is not necessary.

PRACTICALS 50 HRS

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 ++ , acetyl choline and adrenaline on frog's heart. - 5 Hrs
2. Effect of acetyl choine on rectus abdominis muscles of frog and guinea pig ileum. - 6 Hrs
3. Effect of spasmogens and relaxants of rabbits intestine. - 6 Hrs
4. Effect of local anaesthetics on rabbit cornea. - 6 Hrs
5. Effect of mydriatics and miotics on rabbits eye. - 3 Hrs
6. To study the action of strychnine on frog - 3 Hrs
7. Effect of digital on frog's heart - 3 Hrs
8. Effect of hypnotics in mice - 3 Hrs
9. Effect of convulsants and anticonvulsant in mice or rats - 6 Hrs
10. Test for pyrogens - 3 Hrs

11. Taming and hypnosis potentiating effect of chlorpromazine in mice/rats - 3 Hrs
12. Effect of diphenhydramine in experimentally produced asthma in guinea pigs. - 3 Hrs

REFERENCE BOOKS

1. The Pharmacological Basis of Therapeutics edited by Louis.S. Goodman and Alfred Gilmann – 8 th Edition.
2. Pharmacology by Rang & Date (ELBS)
3. Pharmacology Pharmacotherapeutics by R.S. Batoskar & S.D Bhandarker – Popular Prakashan, Bombay.
4. Hand book of Experimental Pharmacology by S.K .Kulkarni & P.C Dandiya (Vallaph Prakashan, Delhi-52)
5. Fundamentals of Experimental Pharmacology by M.N.Ghosh.

2.4 PHARMACEUTICAL JURISPRUDENCE

THEORY **50 HRS**

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 Hrs
2. Principles and significance of Professional Ethics. Critical study of the code of Pharmaceutical Ethics drafted by Pharmacy Council of India. - 2 Hrs
3. Pharmacy Act, 1948-The general study of 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. - 9 Hrs
4. The Drugs and Cosmetics Act, 1940- General study of the Drugs and Cosmetics Act and Rules thereunder. Definitions and salient features related to retail and wholesale distribution of drugs. The powers of Inspectors, the sampling procedures and the procedure and formalities in obtaining licences under the rule. Facilities to be provided for running a Pharmacy effectively. General study of the schedules with special reference to schedule C, C1, F, G, J, H, P and X and salient features of labelling and storage conditions of drugs. - 10 Hrs
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. - 4 Hrs
6. Narcotic Drugs and Psychotropic Substances Act, 1985. A brief study of the Act with special reference to its objectives, offences and punishment. - 8 Hrs
7. Brief introduction to the study of the following Acts :
    a. Latest Drugs (Price Control) Order in force - 3 Hrs
    b. Poisons Act 1919 (as amend to date) - 3 Hrs
    c. Medicinal and Toilet Preparations (Excise Duties) Act, 1955 (as amended to date) - 6 Hrs
    d. Medical Termination of Pregnancy Act, 1971 (as amended to date) - 3 Hrs

REFERENCE BOOKS

5. A text book of Forensic Pharmacy - N.K.Jain
6. Pharmaceutical Jurisprudence - Binay Kumar Jha.
7. Forensic Pharmacy- B.Suresh
8. Forensic Pharmacy – B.M.Mithal
9. Forensic Pharmacy & Ethics – Mahajan & Narang

2.5 DRUG STORE & BUSINESS MANAGEMENT

THEORY 75 HOURS Part I : Commerce (50 hours)

1. Introduction – Trades, industry and commerce, Functions and subdivision of commerce, Introduction to elements of economics and management. - 6 Hrs
2. Forms of Business Organisation - 5 Hrs
3. Channels of Distribution - 6 Hrs
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 suppliers. - 6 Hrs
5. Inventory Control-Objects and importance, modern techniques 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 Hrs
6. Sale promotion, market research, salesmanship, qualities of a salesman, advertising and window display. - 7 Hrs
7. Recruitment, training, evaluation and compensation of the pharmacist. - 7 Hrs
8. Banking and Finance-Service and functions of bank, finance planning and sources of finance. - 7 Hrs

Part II : Accountancy (25 hours)

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

1. REFERENCE BOOKS

1. Drug Store & Business Management - R.M.Mehta
2. Principles of Economics – Sankaran
3. Personal Management & Industrial Relations- Varma & Agarwal
4. Marketing- N.Rajan Nair & R. Nair
5. Industrial Economics- R.R.Barthwal
6. Business Organisation & Management- V.K. Bhusan
7. Advanced Accountancy- R.L.Gupta & Radhaswamy
8. Commercial Correspondence & Office Management- R.S.N. Pillai & Bagavathi
9. Drug Store &Business Management- Mohan Singal & Jaidev
10. Management Systems- N.G.Nair
11. Introduction To Industrial Management- B.K. Chellappan
12. Drug Store & Business Management- Neelam Mahajan
13. Tata's Drug Store &Business Management- Henry A Smith
14. Principles of Pharmaceutical Marketing- Smiths
15. The Hindu Speaks On Management- Ravi
16. Pharmacy Administration And Industrial Business Management- Arul Balaji.N

2.6 HOSPITAL & CLINICAL PHARMACY

THEORY **75 HOURS**

Hospital Pharmacy

1. Hospitals-Definition, function, classification based on various criteria, organization, management and health delivery system in India. - 2 Hrs

2. Hospital Pharmacy - 4 Hrs

a. Definition
b. Functions and objectives of hospital pharmaceutical services
c. Location, layout, flow chart of materials and men.
d. Personnel and facilities requirements including equipments based on individual and basic needs.
e. Requirements and abilities required of hospital pharmacists.

3. Drug Distribution System in Hospitals - 6 Hrs

a. Out-patient services
b. In-patient services: (i) types of services (ii) detailed discussion of Unit Dose system. Floor ward stock system; Satellite pharmacy services, Central sterile services, Bed side pharmacy.

4. Manufacturing - 4 Hrs

a. Economical considerations, estimation of demand
b. Sterile manufacture-large and small volume parenterals, facilities, requirements, layout, production planning, man-power requirements.
d. Non-sterile manufacture-Liquid orals, externals, Bulk concentrates.
e. Procurement and testing of raw materials.

5. Nomenclature and uses of surgical instruments and hospital equipments and health accessories. - 3 Hrs

6. P.T.C. (Pharmacy Therapeutic Committee), Hospital Formulary system and their organization, functioning, composition. - 5 Hrs

7. Drug information service and Drug information bulletin - 3 Hrs

8. Surgical dressings like cotton, gauze, bandages and adhesive tapes including their pharmacopoeial tests for quality. Other hospital supply e.g. I.V. sets, B.G. sets, Ryals tubes, Catheters, Syringes etc. - 3 Hrs

9. Application of computers in maintenance of records, inventory control, medication monitoring, drug information and data storage and retrieval in hospital and retail pharmacy establishment. - 3 Hrs

Clinical Pharmacy

1. Introduction to clinical pharmacy -Definition, scope. - 1 Hr
2. Modern dispensing aspects-pharmacists and patient counseling and advice for the use of common drugs, medication history - 2 Hrs
3. Common daily terminology used in the practice of medicine - 2 Hrs
4. Disease, manifestations and pathophysiology including salient symptoms to understand the disease like Tuberculosis, Hepatitis, Rheumatoid Arthritis, Cardiovascular diseases, Epilepsy, Diabetes, Peptic Ulcer, Hypertension. - 4 Hrs
5. Physiological parameters with their significance - 1 Hr
6. Drug Interactions: - 8 Hrs
   a. Definition and introduction
   b. Mechanism of drug interaction
   c. Drug-Drug interaction with reference to analgesies, diuretics, cardio vascular drugs, Gastro-intestinal agent, Vitamins and Hypoglycemic agents.
   d. Drug-food interaction

7. Adverse Drug Reactions : - 8 Hrs
   a. Definition and significance
   b. Drug-induced disease 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. - 8 Hrs
9. Drug dependence, drug abuse, addictive drugs and their treatment, complications. - 4 Hrs
10. Bio-availability of drugs, including factors affecting it. - 4 Hrs

PRACTICAL **50 HOURS**

1. Preparation of transfusion fluids - 10 Hrs
2. Testing of raw materials used in preparation of transfusion fluids - 25 Hrs
3. Evaluation of surgical dressings - 6 Hrs
4. Sterilization of surgical instruments, glassware and other hospital supplies. - 6 Hrs
5. Handling and use of data processing equipments. - 3 Hrs

REFERENCE BOOKS

1. Hospital and Clinical Pharmacy – Paradkar & Charwala
2. A text book of Hospital and Clinical Pharmacy-Dandiya and Mukul Mathur
3. Hospital and Clinical Pharmacy : theory and Practical – K. Sampath.
4. Hospital and Clinical Pharmacy – Pratibha Anand &R.K.Khar.
5. A text book of Hospital Pharmacy- Merchand & Quadry
6. Hospital and Clinical Pharmacy – Yadav A.V. & B.V.Yadav.
7. Practical Hospital and Clinical Pharmacy – A.K. Pradkar , S.B. Gokhale