EDUCATION REGULATIONS 1991 FOR THE DIPLOMA COURSE IN PHARMACY

(As amended by the Education (Amendment) Regulations 1994)
(Regulations framed under section 10 of the Pharmacy Act, 1948)

(As approved by the Government of India, Ministry of Health vide letter No. V 13016/1/89-PMS dt. 2.8.1991 and notified by Pharmacy Council of India in Gazette of India, Part-III, Section 4, No. 28 dated 11th July, 92 and subsequently amended by Education (Amendment) Regulations 1994 vide notification No. 14-55/93 (Part-I)/PCI/2447-2981 dated 28.6.94 published in the Gazette of India, Part-III, Section 4, No. 28 dt. 9th July, 1994)

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EDUCATION REGULATIONS OF THE PHARMACY COUNCIL OF INDIA

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PHARMACY COUNCIL OF INDIA EDUCATION REGUALTIONS, 1991 FOR THE DIPLOMA COURSE IN PHARMACY

Regulations framed under section 10 of the Pharmacy Act, 1948).

(As approved by the Government of India, Ministry of Health vide, letter No. V. 13016/1/89-PMS dt. 2-8-1991 and notified by Pharmacy Council of India.)

No. 14-55/87 (Part)-PCI/2484-2887—In exercise of the powers conferred by section 10 of the Pharmacy Act, 1948 (8 of 1948), the Pharmacy Council of India, with the approval of the Central Government, hereby makes the following regulations namely:—

CHAPTER-I

1. *Short title and commencement.*— (1) These regulations may be called the Education Regulations, 1991.

(2) They shall come into force on the date of their publication in the official Gazette.

2. *Qualification for Pharmacist.*— The minimum qualification required for registration as a pharmacist shall be a pass in Diploma in pharmacy (Part I & 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)

"[1]5[Minimum qualification for admission to Diploma in Pharmacy Part-I course—A pass in any of the following examinations with Physics, Chemistry and Biology or Mathematics.

(1) Intermediate examination in Science;

(2) The first year of the three year degree course in Science,

(3) 10+2 examination (academic stream) in Science;

(4) Pre-degree examination;

(5) 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 Tribes candidates in accordance with the instructions issued by the Central Govt./State Govts./Union Territory Admns. 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 hour 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 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 and Business Management	75	—
Hospital and 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 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.

[1][Subs. by Education (Amendment) Regulations, 1994, published in the Gazette of India, Part-III, Section-4, No. 28, dt. 9th July, 1994 Page 3709-3710 (w.e.f. 9.7.94)

Provided that the Pharmacy Council of India shall not approve any institution under this regulation unless it provides adquate arrangements for teaching in regard to building accommodation, equipment and teaching staff as specified in Appendix-B to these regulations.

10. *Examinations.*— There shall be an examination for Diploma in Pharmacy (Part-I) to examine students of the first year course and an examination for Diploma in Pharmacy (Part-II) to examine 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 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:—

[1]TABLE-III
DIPLOMA IN PHARMACY (PART I) EXAMINATION

Subject	Maximum marks for Theory			Maximum marks for practicals		
	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
Bio-chemistry and Clinical pathology	80	20	100	80	20	100
Human Anatomy and Physiology	80	20	100	80	20	100
Health Education and Community Pharmacy	80	20	100	—	—	—
			600	+		500=1100

*Internal assessment.

[2]TABLE-IV
DIPLOMA IN PHARMACY (PART II) EXAMINATION

Subject	Maximum marks for Theory			Maximum marks for practicals		
	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 and Business Management	80	20	100	—	—	—
Hospital and 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 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

1 and 2 subs. by Education (Amendment) Regulations, 1994, published in the Gazette of India, part-III, Section-IV, No. 28, dt. 28th July, 94. Page 3710 (w.e.f. 9.7.94).

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*

(1) Each theory and practical examination in the subjects mentioned in Table-III & IV shall be of three hours duration.

(2) A Candidate who fails in theory or practical examination of a subject shall re-appear both in theory and practical of the same subject.

(3) Practical examination shall also consist of a viva-voce (Oral) examination.

14. [1][*Award of sessional marks and maintenance of records*

(1) 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 and 20 marks for each theory and 20 marks for each practical subject shall be allotted as sessional.

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

(3) The sessional marks in practicals 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 paractical 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 the 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 a single attempt.

16. *Eligibility for promotion to Diploma in Pharmacy (Part-II)*

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 subject shall debar him/ 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 examination shall be the basis for improved sessional marks in theory. The sessional of practicals shall be improved by appearing in additional practical examinations. Marks awarded to a candidate for day to day assesment in the pratical class can not be improved unless he/she attends a regular course of study again.

18. *Approval of examinations:* The examinations mentioned in regulations 10 to 13 and 15 shall be held by an authority herein after referred to as the Examining Authority in a State, which shall be approved by the Pharmacy Council of India under sub-section (2) of section 12 of the Pharmacy Act, 1948. Such approval shall be granted only if the Examining Authority concerned fulfills the conditions as specified in Appendix-C to these regulations.

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

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

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[1]. [Sub. by Education (Amendment) Regulations, 1994, published in the Gazette of India, Part-III, Section 4, No. 28, dt. 9th July, 1994. Page 3710 (w.e.f. 9.7.94).

CHAPTER-III

Diploma in Pharmacy (Pat-III)
(Practical Training)

20. *Period and other conditions for Practical Training*

(1) After having appeared in Part-II examination for the Diploma in Pharmacy, conducted by Board/ University or other approved Examining Body or any other course accepted as being equivalent by the Pharmacy Council of India, a candidate shall be eligible to undergo practical training in one or more of the following institutions namely:

(i) Hospitals/Dispensaries run by Central/ State Governments/Municipal Corporation/Central Government Health Scheme and Employees State Insurance Scheme.

(ii) A Pharmacy, Chemist and Druggist licensed under the Drugs and Cosmetics Rules, 1945 made under the Drugs and Cosmetics Act, 1940 (23 of 1940)

(iii) Drugs manufacturing Unit licensed under the Drugs and Cosmetics Act, 1940 & rules made thereunder.

(2) The intitutions referred in sub-regulation (1) shall be eligible to impart training subject to the condition that the number of student pharmacists that may be taken in any hospital, pharmacy, chemist and druggist and drugs 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 work in which the student pharmacist is undergoing 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 recognised by Pharmacy Council of India on fulfilling the conditions specified in Appendix-D to these regulations.

(4) In the course of practical training, the trainee 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—

(a) the manipulation of pharmaceutical appartus in common use.

(b) the reading, translation and copying of prescription including checking of doses;

(c) the dispensing of prescription illustrating the commoner methods of administering medicaments; and

(d) the storage of drugs and medical prepartions.

(5) The practical training shall 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*

(1) The head of an academic training institution, on applicaiton, shall supply in triplicate 'Practical Trainning Contract Form for qualification as a Pharmacist' (hereinafter referred to as the Contract Form) to candidate eligible to under take the said practical training. The Contract Form shall be as specified in *Apendix-E* to these regulations.

(2) The Head of an academic training institution shall fill section I of the Contract Form. The trainee shall fill Section II of the said Contract Form and the Head of the institution agreeing to impart the training (hereinafter referred to as the Apprentice Master) shall fill Section III of the said 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 academic training institution and the other two 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 Doploma 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 regulations.

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/ PCI/4235-4650 dt. 8th July, 1981 is hereby repealed.

(2) Notwithstanding such repeal,

(a) anything done or any action taken under the said regulations shall be deemed to have been done or taken under the corresponding provision of these regulations.

(b) a person who was admitted as a student under the said regulation to the course of training for Diploma in Pharmacy and who had not passed the examination at the commencement of these regulations shall be required to pass the examination in accordance with the provision of the said regulation 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.

APPENDIX-A

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 Pharmacopocias with special reference to the Indian Pharmacopoeia.

3. Metrology-Systems of wights and measures. Calculations including conversion from one to another system. Percentage calculations and adjustments of products. Use of alligation method in calculations, Isotonic solutions.

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. Size reduction Objectives, and factors affecting size reduction, methods of size reduction—Study of Hammer mill, Ball mill, Fluid Enegy Mill and Disintegrator.

6. Size separation-Size separation by sifting. Official Standard 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 Candles, Metafilter.

9. Extraction and Galenicals-(a) Study of percolation and maceration and their modification, 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 sterilization process.

(i) Sterilization with moist heat,

(ii) Dry heat sterilization,

(iii) Sterilization by radiation,

(iv) Sterilization by 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 inculding 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 gelating capsules; different sizes 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 categories illustrating different techniques involved.

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

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 metabisulphite, Sodium thiosulphate, Nitrogen and Sodium Nitrite.

(C) Gastrointenstnal agents—

(i) Acidifying agents Dilute hydrocholoric 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, Silicone 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 sulphur precipitated sulphur, selenium sulphide.

(iv) Astringents:—Alum and Zinc Sulphate.

(E) Dental Products-Sodium Fluride, Stannous Flouride, Calcium carbonate, Sodium metaphosphate, 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 tartrate.

(I) Antidotes—Sodium nitrate.

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, Sidium 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 Sulfate 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 official preparations.

Radio opaque Contrast media-Barium sulfate.

5. Quality control of Drugs and Pharmaceuticals-Importance of quality control, significant errors, methods used for quality control, sources of impurities in Pharmeceuticals, 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, sulfate, 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 (at least 3)
   b. Redox titrations (One each of Permanganometry and iodimetry)
   c. Precipitation titrations (at least 2)
   d. Complexometric titrations (Calcium and Magnesium)

Book recommended (Latest editions)

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, 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, Ashwagandha, Ephedra, Opium, Cannabis, Nux vomica.

(f) Antihypertensives—Rauwolfia.

(g) Antitussives—Vasaka, Tolu balsam, Tulsi.

(h) Antirheumatics—Guggul, Colchicum.

(i) Antitumour—Vinca.

(j) Antiulcerotics—Chaulmoogra Oil.

(k) Antidiabetics—Pterocarpus, Gymnema, Sylvestro.

(l) Diuretics—Gokhru, Punarnava.

(m) Antidysentrics—Ipecacuanha.

(n) Antiseptics and disinfectants Benzoin, Myrrh. Nim, curcuma.

(o) Antimalarials—Cinchona.

(p) Oxytocics—Ergot.

(q) Vitamines—Shark liver Oil and Amla.

(r) Enzymes—Papaya, Diastase, Yeast.

(s) Perfumes and flavouring agents—Peppermint Oil, Lemon Oil, Orange Oil, Lemon grass Oil, Sandalwood.

(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 drug 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 fibre.

8. Gross anatomical studies of Senna, Datura, Cinnamon, Cinchona, Fennel, Clove, Ginger, Nuxvomica & Ipecacuanha.

PRACTICAL (75 hours)

1. Identification of drug 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 Protcins, 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, Bilirubin, SGPT, SGOT, Calcium, Diastase, Lipase).

3. Examination of sputum and faeces (microscopic and 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 system 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, position, attachments and functions of various skeletal muscles. Physiology of neuromuscular 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 sedimenation 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, modes 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 disintection, 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 prescription; 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 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	Gargles
Syrups	Mouth washes Throat-paints Douches
Elixirs	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.

(ii) Emulsions—Types of emulsions, identification of emulsion system, 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—Defference 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 seal 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, Extra Pharmacopoeia.

2.2 PHARMACEUTICAL CHEMISTRY II, Theory (100 hours)

1. Introduction to the nomenclature of organic chemical systems with particular reference to heterocyclic system containing up to 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,* Benzalkoniumchloride, Cetrimide, Chlorocresol*, Chloroxylene, Formaldehyde solution, Hexachlorophene, Liquified phenol, Nitrofurantoin.

Sulfonamides—Sulfadiazine, Sulfaguanidine*,

Phthalylsulfathiazole, Succinylsulfathiazole, Sulfadimethoxine, Sulfamethoxypyridazine, Sulfa methoxazole, co-trimoxazole, Sulfacetamide*.

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

Anti-tubercular Drugs—Isoniazid*, PAS*, Streptomy-

cin, Rifampicin, Ethambutol*, Thiacetazone, Ethionamide, Cycloserine, Pyrazinamide*

Antiamoebic and Anthelmintic Drugs—Emetine, Metronidazole*, Halogenated hydroxyquinolines, diloxanidefuroate, Paramomycin Piperazine*, Mebendazole, D.E.C.*,.

Antibiotics—Benzyl Penicillin*, Phenoxy methyl

Penicillin*, Benzathine Penicillin, Ampicillin*, Cloxacillin, Carbenicillin, Gentamicin, Neomycin, Erythromycin, Tetracycline, Cephalexin, Cephaloridine, Cephalothin, Griseofulvin, Chloramphenicol.

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

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

Tranquilizers—Chlorpromazine*, Prochlorperazine, TrifluoPerazine, Thiothixene, Haloperidol*,

Triperidol, Oxypertine, Chlordiazepoxide, Diazepam*, Lorazepam, Meprobamate.

Hypnotics:—Phenobarbitone*, Butobarbitone, Cyclobarbitone, Nitrazepam, Glutethimide*, Methyprylone, Paraldehyde, Triclofos sodium.

General Anaesthetics—Halothane*, Cyclopropane*, Diethyl ether*, Methohexital sodium, Thiopental sodium, Trichloroethylene.

Antidepressant Drugs—Amitriptyline, Nortryptyline, Imipramine*, Phenelzine, Tranylcypromine.

Analeptics—Theophylline, Caffeine*. Coramine* Dextroamphetamine.

Adrenergic Drugs—Adrenaline*. Noradrenaline, Isoprenaline*, Phenylephrine, Salbutamol, Terbutaline, Ephedrine*, Pseudoephedrine.

Adrenergic Antagonist—Tolazoline, Propranolol*, Practolol.

Cholinergic Drugs—Neostigmine*, Pyridostigmine, Pralidoxime, Pilocarpine, Physostigmine*.
Cholinergic Antagonists—Atropine*, Hyoscine, Homatropine, Propantheline*, 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, Chlorpropamide*,

Tolbutamide, Glibenclamide, Phenformin*, Metformin.

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

Local Anaesthetics—Lignocaine*, Procaine*, Benzocaine.

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

Analgesics and Anti-pyretics-Morphin, Pethidine*, Codeine, Methadone,Aspirin*, Paracetamol*, Analgin, Dextropropoxyphene. Pentazocine.

Non-steroidal anti-inflammatory Agents-Indomethacin*, phenylbutazone*, Oxyphenbutazone, Ibuprofen, Thyroxine and Antithyroids-Thyroxine*, Methimazole, Methylthiouracil, Propylthiouracil.

Diagnostci Agents-Iopanoic Acid, Propyliodone, Sulfobromophthalein.

Sodium Indigotindisulfonate, 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-Neoplasic Drugs-Actinomycins, Azathioprine, Busulphan, Chlorambucil, Cisplatin cyclophosphamide, Daunorubicin hydrochloride, Fluorouracil, Mercaptopurine, Methotrexate, Mytomycin.

Books Recommended: (Latest editions)

1. Pharmocopoeia of India.
2. British Pharmaceutical Codex.
3. Martindale The Extra Pharmacopoeia.

PRACTICAL (75 hours)

1. Systematic qualitative testing of organic drugs involving Solubility determination, melting point and boiling point, detection of elements and functional groups (10 compounds).

2. Official identification test for certain groups of drugs included in the I.P. like barbiturates, sulfonamides, phenothiazine, 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 aspect:

(i) Drugs acting on the Central Nervous System:

(a) General anaestheies, adjunction to anaesthesia, intravenuous anasesthetics.

(b) Analgestic antipyretics 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) Drug acting on autonomic nervous system.

(a) Cholinergic drug, Anticholinergic drugs, anticholinesterase drugs.

(b) Adrenergic drugs and adrenergic recepter 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, Bronchodilatiors, 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 anti-coagulants, Haemostatics, Blood substitutes and plasma expanders.

(ix) Drugs affecting renal function-Diuretics and antidiuretics.

(x) Hormones and hormone antagonists-hypoglyYcemic 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 laxatives, Antidiarrhoeals, Emetics, Antiemetics, Anti-spasmodics.

Chemotherapy of microbial disease:Urinary antiseptics, Sulphonamides, Penicillins, Streptomycin, Tetracylines and other antibiotics, Antitubercular agents, Antifungal agents, antiviral drugs, antileprotic drugs.

7. Chemotherapy of protozoal diseases. Anthelmintic drugs.
8. Chemotherappy 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. Effec of acetylcholine on rectus abdominis muscle of Frog and guinea pig ileum.
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 pyrogen
11. Taming and hypnosis potentiating effect of chlorpromazine in mice/rats.
12. Effect of diphenhydramine in experimentally produced asthma in guinea pigs.

2.4 PHARMACEUTICAL JURISPRODENCE

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 in 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 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 of schedules C, C_1, F, G, J, H, P and X and salient features of labelling and storage condition of drugs.

5. The Drugs and Magic Remedies (Objectionable Advertisement) Act, 1954—General study of the Act Objectives, special reference to be laid on Adevertisements. Magic remedies and objectionable and permitted advertisements—disease 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 and 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-1 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 Mamangement—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 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. 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 Leger and Trial Balance.

4. Profit and Loss Account and Balance Sheet.

5. Simple technique of analysing financial statements.

Introduction to Budgetting.

Books Recommended (Latest edition)

Remington's Pharmaceutical Sciences.

2.6 HOSPITAL AND CLINICAL PHARMACY

Theory (75 hours)

Part-I: Hospital Pharmacy:

1. Hospitals Definition, Function, Classifications based on various criteria, organisation, Management and Health delivery system in India.

2. Hospital Pharmacy:
   (a) Definition
   (b) Functions and objectives of Hospital Pharmaceutical services.
   (c) Location, Layout, Flow chart of material and men.
   (d) Personnel and facilities requirements including equipments based on individual and basic needs.
(c) Requirements and abilities required for Hospital pharmacists.

3. Drug Distribbution 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 srevices, Central sterile services, Bed Side Pharmacy.

4. Manufacturing:
   (a) Economical considerations, estimation of demand.
   (b) Sterile manufacture—large and smal 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 pharmacopocial tests for quality. Other hospital supply e.g. I.V. sets B.G. sets, Ryals tubes, Catheters, Syringes etc.

9. Application of computer in maintenance of records, inventory control, medication monitoring, drug information and data storage and retrieval in hospital and retial 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, manifestation and pathophysiology including salient symptoms to understand the disease like Tuberculosis, Hepatitis, Rheumatoid Arthritis, Cardiovascular 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, cardiovascular drugs, Gastro-intestinal agents, Vitamins and Hypoglycemic agents.
   (d) Drug—food interaction.

7. Adverse Drug Reactions:
   (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 dependences, Drug abuse, addictive drugs and their treatment, complications.

10. Bio-availability of drugs, including factors affecting it.

Books recommended (latest editors)

1. Remington's Pharmaceutical Sciences.
2. Martindale The Extra Pharmacopocia.

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.

APPENDIX-B

(See regulation 9)

CONDITIONS TO BE FULFILLED BY THE ACADEMIC TRAINING INSTITUTION

Any authority in India applying to the Pharmacy Council of India for approval of courses of study for Pharmacists under sub-section (1) of section 12 of the Pharmacy Act, 1948 shall provide.

(A) *ACCOMMODATION*

Suitable and sufficient accommodation with adequate ventilation lighting and other hygienic conditions should be provided to the rooms for Principal/Head of the department, office, class room, library, staff, staff common room, students common room, museum, stores etc.

At least four laboratories specified below should be provided for:—

1. Pharmaceutics Lab.
2. Pharm. Chemistry Lab.
3. Physiology, Pharmacology and Pharmacognosy Lab.
4. Biochemistry, Clinical Pathology, Hospital and Clinical Pharmacy Lab.

In addition to the laboratories, balance room, aseptic room or cabinet, animal house, a machine room are also to be provided for.

Floor area of the laboratory should not be less than 30 square feet per student required to work in the laboratory at any given time subject to a minimum of 500 square feet.

Laboratories should be fitted and constructed in a manner that these can be kept reasonably clean. Gas and water fitings, shelves, fume cupboards be provided wherever necessary.

(B) *STAFF*

Principal/Director/Head of the department may be engaged in teaching upto *Eight* hours a week, and the work load of other teaching staff should not be more than 16 hours per week.

Staff student ratio should not exceed 1 : 60 in theory classes and 1 : 20 in practical classes. There should be two teachers for a batch of 30 students in practicals.

According to the above norms, the following staff is required for an intake of 60 students:

[4]Professor/Reader —One

Senior Lecturers/Lecturers —Seven

The minimum qualifications of The Principal/Director/Head of the Institution/Department, and the teachers be as given below:

Principal/Director/ Head of Institution/ Department (Professor/ Reader)	Basic degree in pharmacy and Post-graduate in any discipline of Pharmaceutical Sciences with not less than 5 years experience in teaching.
Lecturer	M. Pharm or B. Pharm with 3 years teaching/ professional experience.
[5][Lecturer (1) Anatomy & Physiology (2) Biochemistry & Clinical pathology	M. Pharm or B. Pharm with 3 years teaching/professional experience or M.B.B.S.

The pay scale of teaching staff shall be as prescribed by the All India Council for Technical Education for teaching staff of Polytechnics from time to time."]

Provided that the above qualifications shall not apply to the incumbents appointed under the repealed Education Regulations.

Non-Teaching Staff

List of Non-Teaching staff for the D. Pharm course:

1. Laboratory Technician . . . . . (Qualification-Diploma in Pharmacy)	2
2. Laboratory Attendent	4
3. Office Superintedent	
4. Clerk-cum-Accountant	1
5. Store-Keeper	1
6. Typist	1
7. Asstt. Librarian.	1
8. Peons	2
9. Cleaners/Sweepers	4
10. Gardener	1

[4]He may also work as Principal or Head of the department, as the case may be.

[5]Added by Education (Amendment) Regulations, 1994, published in Gazette of India, Part-III, Section 4, No. 28 dt. 9th July, 1994 page 3710 (w.e.f. 9.7.94)

1. List of Equipment for Pharmaceutics Laboratory

A. Special equipment and instruments	No. required for 60 students	No. required for 120 students.
1	2	3
1. Continuous hot extraction equipment	5	10
2. Conical percolators	20	40
3. Tincture Press	1	1
4. Hand grinding mill	5	5
5. Disintegrator	1	1
6. Ball mill	1	1
7. Hand operated tablet machines	3	3
8. Tablet coating pan unit with hot air blower Laboratory size	1	1
9. Polishing Pan Laboratory size	1	1
10. Tablet Hardness Tester (Monsanto Type)	3	3
11. Tablet Hardness Tester (Pfizer type)	3	3
12. Disintegration Test Unit	2	2
13. Dissolution Rate Test apparatus	1	1
14. Granulating sieve sets	20	40
15. Tablet counter small size	5	5
16. Friability Tester	1	1
17. Collapsible Tube filling and sealing equipments	2	2
18. Capsule filling machine (Laboratory size)	2	2
19. Prescription balance	40	60
20. Balance Torsion type with removable glass pan sensitivity, 30 mgm.	5	5
21. Distillation equipment for distilled water	2	2
22. Water deionization Unit	1	2
23. All glass distillation Unit for making water for injection	2	4
24. Ampoule washing machine	1	1
25. Ampoule filling and sealing machine	1	1
26. Sintered glass filters for (4 different grades) Bacteria proof filtration	20 each grades	20 each grades
27. Millipore filters 3 grades	2 each grades	2 each grades
28. Autoclaves	2	2
29. Pressure cookers	5	10
30. Hot Air sterilizer	2	3
31. Incubators	2	2
32. Aseptic cabinet	2	3
33. Rabbit cages and holders	10	10
34. Ampoule clarity Test equipments	2	2
35. Blender	2	3
36. Sieves Set (Pharmacopoeial standard)	10	10
37. Laboratory centrifuge	2	3
38. Ointment slabs	40	40
39. Ointment spatulas	40	40
40. Pestle and mortar (Porcelain)	40	40
41. Pestle and mortar (glass)	10	10
42. suppository moulds of 3 size	20 each	30 each
43. Refrigerator	1	1
B. General glassware	Adequate	Adequate
C. Chemicals, appliances and laboratory facilities	Adequate	Adequate

2. List of Equipment for Pharmaceutical Chemistry Laboratory

A. Special equipment and instruments	No. required for 60 students	No. required for 120 students.
1	2	3
1. Refractometer	1	1
2. Polarimeter	1	1
3. Photo electric Colorimeter	1	1
4. pH meter	2	2
5. Atomic model sets	10	10
6. Analytical balances and weightbox sets	10	15
7. Physical balances & weight box sets	5	5
8. Platform balance	2	2
9. Periodic Table chart	2	2
B. General Glassware	Adequate	Adequate
C. Miscellaneous appliances, Chemicals and laboratory facilities	Adequate	Adequate

3. List of Equipment for Physiology/Pharmacology Laboratory

A. Special Equipment and Instruments	Nos. required for 60 Students	Nos. required for 120 students
1	2	3
1. Haemoglobinometer	20	30
2. Haemocytometer	10	20
3. Student's Organ bath	5	10
4. Sherrington rotating drum	5	10
5. Frog Boards	10	20
6. Trays (dissecting)	10	20
7. Frontal writing levers	15	30
8. Aeration tube	20	40
9. Telethermometer	1	2
10. Pole Climbing apparatus	1	2
11. Histamine chamber	1	2
12. Simple levers	15	30
13. Starling heart levers	10	20
14. ECG mechine	—	—
15. Aerators	5	10
16. Histological slides	25	25
17. Sphygmomanometer (B. P. apparatus)	5	5
18. Stethoscope	5	5
19. First aid equipments	5 sets	5 sets
20. Contraceptive device	5 sets	5 sets
21. Dissecting (Surgical) instruments	20 sets	30 sets
22. Operation table (small)	2	2
23. Balance for weighing small animals	1	2
24. Kymograph paper	Adequate	Adequate
25. Activity cage (actophotometer)	1	1
26. Analgesiometer	1	1
27. Thermometers	20	20
28. Distilled water stills	2	2
29. Plastic animal cages	10	10
30. Double unit organ bath with thermostat	1	1
31. Refrigerator	1	1
32. Single pan balance	1	1
33. Charts	Adequate	Adequate
34. Human Skelton	1	1
35. Anatomical Specimen (Heart, brain, eye, ear, reproductive system etc.).	1 set	1 set
36. Electro-convulsometer	1	1
37. Stop watches	10	10
38. Clamp, Bossheads, Screw clips	Adequate	Adequate
39. Symes' Cannula	20	40
1	2	3
B. General Glassware	Adequate	Adequate
C. Chemical and Misc. laboratory apparatus and appliances (needles, thread, plasticin, tubing, burners, polythene tubes, syrings etc.)	Adequate	Adequate

4. List of Equipment for Biochemistry and clinical Pathology Laboratory

A. Special Equipment and Instruments	No. required for 60 students	No. required for 120 students
1	2	3
1. Colorimeter	2	2
2. Microscopes	20	20
3. Permanent slides..... (Skin, Kidney, Pancreas, smooth-muscle, liver etc.)	Adequate	Adequate
4. Watch glasses	25	50
5. Centrifuge	1	1
6. Microscope with oil immersion	5	5
B. General Glassware	Adequate	Adequate
C. Biochemical reagents for analysis of normal and pathological constitutents of urine and blood and facilities.	Adequate	Adequate

5. List of Equipment for Pharmacognosy Laboratory

A. Special Equipment and Instruments	Nos. required for 60 students	Nos. required for 120 Students
1	2	3
1. Dissecting Microscope	20	20
2. Charts (different types)	100	100
3. Models (different types)	50	50
4. Permanent slides	100	100
5. Slides and cover slips	Adequate	Adequate
B. General glassware	Adequate	Adequate

1	2	3
C.	Miscellaneous appliances, Chemicals and laboratory facilities	Adequate	Adequate

6. List of Equipments for Hospital and Clinical Pharmacy Practicals

		Quantity
1.	Water Still	1
2.	Mixing Vat with stirrer	2
3.	Filtration equipment	2
4.	Filling machine	1
5.	Sealing machine	1
6.	Autoclave sterilizer	1
7.	Membrane filter	1 Unit
8.	Sintered glass funnel with complete filtering assembly	10 Units
9.	Small disposable membrane filters for IV admixture filtration	Adequate
10.	Laminar air flow bench	1
11.	Vacuum pump	1
12.	Ovens	2
13.	Surgical dressing	2
14.	Incubator	1
15.	Karl Fischer apparatus for moisture content determination	1
16.	Flame photometer	1
17.	pH meter	1
18.	Dissolution apparatus	1
19.	Disintegration test apparatus	1
20.	Hardness tester	1
21.	Centrifuge	1
22.	Magnetic stirrer	1
23.	Thermostatic bath	1
24.	Experimental Animals	Adequate

7.	General List of Equipment	Nos. required for 60 students	Nos. required for 120 students
	1	2	3
1.	Distilled water still	2	2
2.	Vacuum pump	2	3
3.	Refrigerator	1	2
4.	General filling equipment for the museum	Adequate	Adequate
5.	Compound microscopes	20	20
6.	Oil immersion microscope	1	2
7.	Over head projector	1	1
8.	Slide cum strip projector	1	1
9.	Projection screen	1	1

Museum

Every institution shall maintain a museum of crude drugs, harbarium sheets, botanical specimens of the drugs and plants mentioned in the course. In addition, the following are recommended:—

1. Coloured slides of medicinal plants:
2. Display of popular patent medicines; and
3. Containers of common usage in medicines.

Library

Every institution shall maintain a library which should contain books mentioned in the syllabus and also the current pharmaceutical journals. There should be adequate place in the library for students and staff to refer books.

NOTE: The above requirements are the minimum requirements and the Institute is free to provide more-physical and Teaching facility.

APPENDIX-C
(See regulation 18)

CONDITIONS TO BE FULFILLED BY THE EXAMINING AUTHORITY

1. The Examining Authority shall be either a statutory Indian University or a body constituted by the Central or State Government. It shall ensure that discipline and decorum of the examinations are strictly observed at the examination centres.

2. It shall permit the Inspector or Inspectors of the Pharmacy Council of India to visit and inspect the examinations.

3. It shall provide:-

(a) adequate rooms with necessary furniture for holding written examinations;

(b) well-equipped laboratories for holding practical examinations;

(c) an adequate number of qualified and responsible examiners and staff to conduct and invigilate the examination; and

(d) such other facilities as may be necessary for efficient and proper conduct of examinations.

4. It shall, if so required by a candidate, furnish the statement of marks secured by a candidate in the examinations after payment of prescribed fee, if any, to the Examining Authority.

5. It shall appoint examiners whose qualifications should be similar to those of the teachers in the respective subjects as shown in Appendix-B.

6. In pursuance of sub-section (3) of section 12 of the Pharmacy Act, 1948, the Examining Authority shall communicate to the Secretary, Pharmacy Council of India not less than six weeks in advance the dates fixed for examinations, the time-table for such examinations, so as to enable the Council to arrange for inspection of the examinations.

7. [1][The Chairman and at least one expert member of Examining Committee of the Examining Authority concerned with appointment of examiners and conduct of pharmacy examinations should be persons possessing Pharmacy qualifications."]

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1. Added by Education (Amendment) Regulations, 1994 published in the Gazette of India, Part-III, Section 4, No. 28, dated 9th July, 1994. Page 3710 (w.e.f. 9.7.94).

APPENDIX-D

[See regulations 20 (3)]

CONDITIONS TO BE FULFILLED BY THE INSTITUTION TO BE RECOGNISED FOR GIVING PRACTICAL TRAINING.

1. The Institution, where practical training is given to student pharmacists, shall from time to time, if required, furnish such information as may be needed by the Pharmacy Council of India about the staff, accommodation and equipment of the institution concerned and its working.

2. The Institution shall permit the Inspectors of the Pharmacy Council of India to inspect the premises at any reasonable time while the work is proceeding therein.

3. The Institution shall entrust some member or members of its staff, who shall be registered pharmacist (s), to look after the student pharmacists. Such members of the staff shall be responsible in this behalf to the Head of the Institution concerned.

4. The Institution shall provide such opportunity, accommodation, apparatus, materials and books of reference as may be required to enable the student pharmacists to undergo the practical training properly.

5. The number of student pharmacists that may be taken in any hospital, pharmacy and chemist and druggist and a drugs manufacturer licensed under the Drugs and Cosmetics Rules, 1945 made under the Drug and Cosmetics Act 1940 shall not exceed two where there is one registered pharmacist engaged in the working in which the student pharmacist is undergoing practical training; where there is more than one registered pharmacist similarly engaged, the number shall not exceed one for each additional such registered pharmacist.

6. The Institution wishing to be recognised under regulation 20 shall apply in writing to the Secretary, Pharmacy Council of India stating its desire, to be so recognised.

7. Having satisfied that the institution shall follow the conditions laid down in these rules, the Pharmacy Council of India shall grant such recognition.

8. In the event of any question arising as to the interpretation or observance of these conditions the decision of the Pharmacy Council of India shall be final.

APPENDIX-E

[See regulations 21 (1)]

PRACTICAL TRAINING CONTRACT FORM FOR PHARMACISTS

SECTION I

This form has been issued----------
(Name of student pharmacist)
son of/daughter of ----------residing at ----
------- who has produced evidence before me that he/she is entitled to receive the Practical Training as set out in the Education Regulations framed under section 10 of the Pharmacy Act, 1948.

Date: The Head of the Academic Training Institution

SECTION II

I----------accept
(Name of the Student Pharmacist)
----------of----------
(Name of the Apprentice Master) (Name of the Institution)----------

(Hospital or Pharmacy) as my Apprentice Master for the above training and agree to obey and respect him/her during the entire period of my training.

(Student Pharmacist)

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 organisation so that during his/her training he/she may acquire:—

1. Working knowledge of keeping of records required by the 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 commoner 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.

(Apprentice Master)

(Name & address of the Institution)

SECTION IV

I certify that _____ has
(Name of student pharmacists)

has undergone———hours training spread over———months in accordance with the details enumerated in SECTION III

_____

(Head of the Organisation or Pharmaceutical Division)

SECTION V

I certify that_____has

(Name of student pharmacists)

completed in all respect his practical training under regulation 20 of the Education Regulations framed under section 10 of the Pharmacy Act, 1948. He had his practical training in an Institution approved the Pharmacy Council of India.

Date: _____

(Head of the Academic Institution)