

Syllabi of Pharmacy Technician approved by Central Pharmacy Council, Pakistan

Chapter-I

PRELIMINARY

1. *Short Title and Commencement*

- (1) These regulations may be called the Pharmacy Council of Pakistan (Examination for Registration in Register “B”) Regulations, 2006.
- (2) They shall come into force at once.

2. *Definitions*

- (1) In these regulations, unless there is anything repugnant in the subject or context,
 - (a) “Examination for Registration in Register “B” means an Examination conducted by a Provincial Council leading to Registration in Register “B”; and
 - (b) “Student” means a student enrolled for the examination for Registration in Register “B”.
- (2) The words and expressions used but not defined herein shall have the same meaning as are assigned to them in the Pharmacy Act, 1967 (XI of 1967).

Chapter-II

OBJECTIVES

3. *General Objectives*

- (1) The general objectives regarding the courses of studies for Registration in Register “B” should be to prepare a health caring and community oriented personnel competent to deal with the common health problems of the People in a scientifically sound and cost-effective manner using appropriate technology and holistic approach under the guidance and supervision of a qualified graduate pharmacist.
- (2) A student after the examination for Registration in register “B” should be able to assume his role and perform his function and communicate effectively.
- (3) The course of study for the examination for Registration in Register “B” should be integrated as far as possible.

4. *Cognitive domain (knowledge) regarding Course for Registration in Register “B”*

A student after passing the examination for Registration in Register “B” should have the concept, basic introduction and knowledge of,

- (a) Preventive and therapeutic measures for management of health and disease.
- (b) Legal aspects and basic principles of pharmacy practice.

- (c) Present and future health problems of community and solutions of such problems through planning, implementation, critical evaluation and research in preventive programs.
- (d) The role of socio-cultural background, socio-economic factors, and changing environment in health and illness.
- (e) Concept and knowledge of drugs and their development.
- (f) Therapeutic uses of drugs and medicines.
- (g) Toxicological manifestation of drugs and their side effects.
- (h) Management of drugs administration, and
- (i) Pharmaceutical care.

5. *Psychomotor domain (skills) regarding Course of Studies for the Examination for Registration in Register "B"*

A student at the conclusion of his study should be able to.

- (a) Assist the Pharmacists in compounding and dispensing the pharmaceutical preparations.
- (b) Assist the Pharmacist in filling, packing and labeling of dispensed medicaments.
- (c) Assist Pharmacist is compounding the pharmaceutical preparations.
- (d) Assist the Pharmacist in the supply and storage of drugs, medical supplies, surgical and miscellaneous items in dispensaries, pharmacies, medical stores, laboratories and hospital wards.
- (e) Assist Pharmacist in preparing and issuing demands or requests for drugs and other medical items from wards and other departments in hospitals.
- (f) Keep inventory records showing the movement of drugs and other medical items in pharmacies and medical stores with special emphasis on their quantities and expiries;
- (g) Properly communicate with other staff of the health care team.
- (h) Refer to library and reference books to collect information whenever needed.
- (i) Gain the required skills to assist the community pharmacist.
- (j) Appreciate the need to update his knowledge through active participation in continuing education programs.
- (k) Perform any other duty assigned to him by the pharmacist.
- (l) Acquire understanding of pharmaceutical manufacturing in order to assist the production pharmacist.
- (m) Assist production pharmacist in normal activities related to manufacturing; and
- (n) Acquire understanding of proper storage conditions.

6. *Affective domain (character and attitudes) regarding Course for Registration in register “B”*

A student at the conclusion of his course for Registration in Register “B” should be able to,

- (a) Display virtues and personal character such as sense of responsibility towards patients, community and colleagues.
- (b) Respect patient’s right of confidentiality
- (c) Recognize his professional limitations.
- (d) Develop and maintain good relations with patients and all persons concerned in the delivery of health care.
- (e) Educate, guide and help in adoption of preventive and curative measures against disease, and
- (f) Improve his professional knowledge, skills and attitudes.

Chapter–III

ADMISSION TO EXAMINATION OR REGISTRATION IN REGISTER “B”

7. Number of admission, etc.

- (1) The optimum number of admissions of students for the Examination for Registration in Register “B” should be as approved by the Pharmacy Council of Pakistan keeping in view the capacity of lecture rooms, the number of seats available in laboratories and the demand of qualified personnels.

8. Minimum Academic requirements for admissions to examination for Registration in Register “B”

- (1) The following shall be the minimum academic qualifications for admission of a candidate to the examination for Registration in Register “B”, namely:
 - (i) The candidate should have passed the Matriculation Examination (Secondary School Certificate Examination) with Science, from a Pakistani University or an equivalent examination of a Board of Intermediate and Secondary education in Pakistan;

OR

- (ii) The candidates should have passed an examination of a foreign university or examining body, which is equivalent Matriculation Examination with science (Secondary School Certificate Examination) of a Board of Intermediate and Secondary Education in Pakistan.

Chapter–IV

OBJECTIVES OF CURRICULUM

9. General Principal and Objectives regarding curriculum and teaching

- (1) The following general principals shall be observed while evaluating students for the examination for registration in register “B”, namely:-
 - (a) Students should be able to recognize and manage common problems, and make appropriate referrals.
 - (b) The role of new developments in the drug delivery system may be kept in mind while working out the details of curriculum, and
 - (c) The examination for the Part I and II will be conducted separately with an intermittent period of one year.
- (2) Integration should be promoted between basic subject, pharmaceutical subjects and different pharmacy subjects.

EXAMINATIONS

10. Objectives of evaluation through examination

- (1) Evaluation of the knowledge and skills will be done through Examination. The Examination shall be spread in two parts *i.e.* Part - I and Part - II. These examination shall be held as and when decided by the Provincial Council with the approval of the Central Council. After a period of one year after appearing in Examination for Part - I, the student will be eligible to appear in the Examination for Part - II. Which will be conducted after a gap of one year.
- (2) The purpose of evaluation through examination should be to,
 - (a) Certify that students have successfully completed the training and have achieved the objectives of educational programme; and
 - (b) Motivate and encourage students to direct their own learning.
- (3) In order to achieve the objectives of evaluation through examinations, it shall be mandatory to adopt the following processes, namely: -
 - (a) No student shall be allowed to sit in Part - II Examination, unless he has passed the Part - I Examination,
 - (b) Not more than three chances shall be allowed for passing each examination;
 - (c) The percentage of pass marks in each subject should not be less than fifty per cent in theory and fifty per cent in practical
 - (d) No grace mark should be allowed in any examination
 - (e) There should not be more than two examinations in a year
 - (f) The performance of candidates in all evaluations and examinations should be carefully supervised
 - (g) Forty per cent of each theory paper shall consist of the multiple choice question (MQCs), while the remaining sixty per cent will be short structured or extended essays etc.
 - (h) In all examinations sufficient time should be assigned to practical work in order to test the thoroughness of knowledge and practical skills of students.
 - (i) A student who appears for examination in any subject and passes in theory but fails in practical or vice versa, shall reappear only in theory or, as the case may be, in practical in which he fails
 - (j) A student who appears for examination in any subject and fails both in theory as well as practical, shall have to reappear in both theory and practical, and
 - (k) A student who appears in an examination and passes in one or more subjects shall not have to reappear for examination in such subjects provided that he passes the subjects in which he fails in a stipulated time period

EDUCATIONAL FACILITIES

11. Requirement of educational facilities

In order to impart good education there shall be provided and maintained adequate educational facilities at pharmacy institutions particularly in the following fields, namely: -

(a) Teaching Staff

Properly qualified and committed teaching staff shall be provided on the basis of a minimum teacher student ratio of 1:10. Institutions shall have a faculty development plan and a career structure. Good teachers shall be rewarded appropriately. Teachers shall be provided with adequate support staff and equipment including access to computers. Training programs for teachers shall be compulsory. All the faculty members must have first degree in Pharmacy and a valid registration with the Pharmacy Council. The Institution shall allocate suitable funds for enabling their permanent faculty members to attend at least two scientific moots in a year in the relevant fields for the purpose of “Continued Education” within the country or abroad.

(b) Education

Pharmacy education shall be imparted as a science which supports development of faculty, and a facility which supports functions of faculty as educators, and students as learners. Educational activities shall involve determination of strategy, use of large variety of audio-visual aids, teaching techniques and computers. A large number of principles of learning have to be applied to the design and practice of teaching. Objective oriented and properly structured evaluation techniques shall be made to become an integral part of the educational process.

(c) Physical Facilities

Purposely built building with dedicated facilities for the education of Pharmacy shall be a pre-requisite. Lecture theaters shall have adequate physical facilities for the whole class.

(d) Conference Rooms

Conference rooms shall be available to promote teacher-student interaction which is necessary for developing and promoting habits of group activity and team work.

(e) Laboratories

Laboratories shall be well-equipped with both simple and high technology for demonstration and experimentation and may be mono-disciplinary or multi-disciplinary.

(f) Libraries

Libraries shall be comfortable and well stocked with standard reference printed matter including access to journals. Libraries shall also include books on humanities, community problems, psychology, occupational health, etc. Library Science shall be utilized to train students in proper reading habits and use of library. Audio-visual libraries shall be developed. Dedicated internet facilities shall also be provided.

(g) Evaluation

Pharmacy institutions shall develop structured and supervised mechanism with in the institution amongst the faculty to ensure appropriate selection, training and evaluation of students. A system for internal evaluation of training program, and appropriate and adequate facilities for teaching the Course shall also be ensured.

(h) Community Oriented Health Care

Community health facilities like Basic Health Units (BHUs) shall be acquired in the vicinity of pharmacy institutions either on the basis of integration or collaboration, for conducting the training. For the practice of proper community-oriented health care, students shall actually participate in the primary health care of community under the guidance of teachers in various disciplines.

It is essential that students develop the concept of integrated problem based health care to deal with common health problems in real community environments.

(i) Finance

Adequate financial provision shall be made for the maintenance and development of pharmacy institution.

(j) Head of the Institution

The head of the Pharmacy institution shall at least hold a bachelor degree in pharmacy or a first professional degree in pharmacy, as the case may be

(k) Administrative Organization

The administrative organization of Pharmacy institution shall be prompt, effective and problem solving in the form of a governing body.

(l) Study Tours and Field Visits

Study tours and field visits shall be organized during the course of studies at appropriate intervals.

Chapter–VII

COURSES OF STUDY AND DISTRIBUTION OF SUBJECTS AND PRACTICALS FOR EXAMINATION FOR REGISTRATION IN REGISTER “B”

12. Courses of study for Examination for Registration in Register “B”

The details regarding course contents of each subject or paper will be as under, namely: -

ANATOMY AND PHYSIOLOGY (WRITTEN)

Paper I	Part - I	100 (20 + 80) Marks
Anatomy		
<ol style="list-style-type: none">1. Introduction to Anatomy2. Anatomical Terminologies3. Surface Anatomy		
Physiology		
<ol style="list-style-type: none">1. Introduction to Physiology2. Structure of Cell and Tissues of the Body:<ol style="list-style-type: none">(i) Bone Structure, Types of Bones and Joints(ii) Muscles (Structure of Skeletal, Smooth & Cardiac Muscle)3. Blood<p>Composition of blood (RBC, WBC and Platelets), Fate of Red Blood Cells, Blood Groups, Rh Factors, E.S.R. Blood Coagulation, Anemia's.</p>4. Circulatory System<p>Properties of the Cardiac Muscle, Heart Beat, Cardiac Cycle, ECG, Blood Pressure, Pulse, Hemorrhage, Lymph.</p>5. Respiratory System<p>Mechanics of respiration, Pulmonary Ventilation, Lungs volume and capacities, Carriage of O₂ and Co₂ by the blood, Regulation of breathing (Nervous and Chemical Control).</p>6. Skin<p>Structure, Functions of Skin, Temperature regulation by Skin.</p>7. Digestive System<p>Introduction of Digestive juices-saliva, Gastric juice, Pancreatic juice, Bile and Intestinal juices, their composition. Movements of the stomach and intestines, Functions of Liver and Gall Bladder.</p>8. Urinary system<p>Urine formation and composition of Urine.</p>		

9. Physiology of Nerve and Muscle
General Introduction to Nervous and Muscular System
10. Nervous System
General Introduction to Nervous and Muscular System
11. Special Sense
Introductory knowledge of structure and functions of the special senses.
12. Endocrinology
Definition of Hormone, Nature, Function and Action of Hormone.

BIOCHEMISTRY AND MICROBIOLOGY (WRITTEN)

Paper II	Part - I	100 (50 + 50) Marks
-----------------	-----------------	----------------------------

Biochemistry (50 marks)

1. General Introduction and Basis Biochemical Principles.
2. General Introduction, Basic Chemistry, Nature and Classification and functions of Carbohydrates, Lipids, Proteins and Amino Acids, Nucleic Acids, Vitamins, Hormones, Enzymes.
3. Role of Vitamins, Physiological Role of Fat-soluble Vitamins (A, D, E and K) and Water-soluble Vitamins (Thiamin, Riboflavin, Pantothenic Acid, Niacin, Pyridoxin Phosphate, Biotin Folic Acid, Cyanocobalamin members of B-Complex family and Ascorbic Acid).
4. Introduction to Biotechnology and Genetic Engineering
5. Acid Base and Electrolyte Valance in Human Body.

Microbiology (50 marks)

1. Introduction and Scope of Microbiology.
2. Nomenclature and classification of Micro-organisms.
 - (i) The Bacteria:
 - (a) Classification of Bacteria
 - (b) Culture Media, Bacterial Cultures and staining Methods.
 - (ii) The Viruses: Nomenclature and Classification of Viruses
 - (iii) Introduction to Fungi, Yeast, Molds.
3. Introduction to Microbiology of Air, Water and Soil.

4. Sterilization and Disinfection.
 - (a) Introduction to sterile area and clean area.
 - (b) Methods and application in pharmacy.
5. Fermentation, Pharmaceutical Products produced by fermentation process.
6. Definitions of the following
Immunity, autoimmunity and tolerance, Antigen, Antibodies, Antigen-Antibody reactions, Hypersensitivity and Allergy.
7. Vaccines and Sera
Introduction and Aims, Types of Vaccines.

PHARMACOGNOSY (WRITTEN)

Paper III	Part - I	100 Marks
1.	Introduction and Scope of Pharmacognosy.	
2.	Classification of Crude Drugs.	
3.	Terminology used in Pharmacognosy.	
4.	Evaluation of Crude Drugs <i>i.e.</i> Organoleptic, Physical, Chemical and Biological.	
5.	Introduction, case history, Skin Test, Treatment and Mechanism of Allergy.	
6.	Enzymes obtained from Plant source (Phyto-enzymes).	
7.	General Introduction of poisonous plants with special reference to Pakistan.	
8.	Separation and Isolation of plant constitutions: An introduction to Chromatography and Chromatographic techniques <i>e.g.</i> (a) Column Chromatography. (b) Paper Chromatography. (c) Thin Layer Chromatography.	
9.	Introduction to Extraction and Extraction Techniques.	
10.	General Introduction, Classification and Medicinal uses of important Plant containing: (a) Glycosides (b) Alkaloids (c) Volatile Oils (Essential Oils) (d) Resins and Resin (e) Carbohydrates (f) Tannins Combinations (g) Lipids (fixed oils, fats and related compounds, waxes	

PHARMACEUTICS-I (General, Physical and Dispensing) (WRITTEN)

Paper IV

Part - I

100 Marks

1. Introduction of Pharmacy in relation to Hospital Pharmacy, Clinical Pharmacy, retail Pharmacy, Industrial Pharmacy and Forensic Pharmacy
2. History of Pharmacy with special reference to contribution of Muslim Scientists in Pharmacy.
3. An introduction of various official books used in Pharmacy.
4. Surface Tension, Viscosity, Ionization, pH, pH Indicators, Buffers, Isotonic Solutions and their applications in Pharmacy.
5. Introduction and application to the following processes in Pharmacy Adsorption, Calcination, Centrifugation, Crystallization, Decantation, Deliquescence, Desiccation, Distillation, Efflorescence, Elutriation, Evaporation, Exsiccation, Fusion, Ignition, Levigation, Lyophilization, Sublimation, Trituration, Vaporization.
6. Introduction to Various Dosage Forms.
7. Basic Principles of Compounding and Dispensing Including, Weight and Measures, Calculations for Compounding and Dispensing, Containers and Closures, Prescription-Handling, Filling, Interpretation, Labeling.
8. Extemporaneous Dispensing of Solutions, Suspension, Emulsions, Creams and Ointments, Pastes and Gels, Suppositories and Pessaries, Powders and Granules, Oral unit dosage form.
9. Introduction to Aseptic Dispensing and TPN Dispensing.
10. Introduction to Incompatibility.

ANATOMY AND PHYSIOLOGY (PRACTICAL)

Paper V

Part - I

100 (20 + 80) Marks

Anatomy

1. Study of Human Skeleton.
2. Histological Examination of Slides; Epithelium, Connective Tissues and Muscles.

Physiology

1. Blood

- | | |
|---|-----------------------------|
| (i) Determination of Hemoglobin (Hb) | (ii) Determination of E.S.R |
| (iii) R.B.C Count | (iv) W.B.C Count |
| (v) D.L.C. (Differential Leucocyte Count) | (vi) Bleeding Time |
| (vii) Coagulation Time | (viii) Blood Groups |

2. Respiration:

- | | |
|-----------------------------------|--|
| (i) Determination of Tidal Volume | (ii) Determination of Artificial respiration |
|-----------------------------------|--|

3. C.V.S.

- | | |
|---------------------------------|---|
| (i) Recording of Arterial Pulse | (ii) Recording of Arterial Blood Pressure |
| (iii) Electro-cardiogram | |

4. Eye

- | | |
|--|----------------------------------|
| (i) Visual and acuity for far vision and near vision | (ii) Field of vision (Perimetry) |
|--|----------------------------------|

BIOCHEMISTRY AND MICROBIOLOGY (PRACTICALS)

Paper VI

Part - I

100 (50 + 50) Marks

Biochemistry (50 marks)

1. Qualitative Analysis of Carbohydrates, Lipids and Sterols (Cholesterol), Blood Analysis.
2. Qualitative Analysis of Carbohydrates-Glucose (reducing sugar) and any other Carbohydrate using Benedict method.
3. Analysis of normal and abnormal components of Urine – Sugar, Uric Acid and Cholesterol.

Microbiology (50 marks)

1. Sterilization of Glassware.
2. Preparation of general and selective media and culturing of microorganisms.
3. Total and viable counts of microorganisms.
4. Staining of bacteria, Gram method.
5. Microbiological Analysis of Air, Water and Soil.

PHARMACOGNOSY (PRACTICALS)

Paper VII	Part - I	100 Marks
------------------	-----------------	------------------

1. Introduction of the entire and broken parts of the plants drugs (Macro and Organoleptic Characters).
2. Microscopic examination of powders and sections of plant drugs.
3. Extraction of the active constituents of crude drugs and chemical tests for their identification.
4. Isolation and Demonstration of Chromatographic Techniques.

PHARMACEUTICS-I (General, Physical and Dispensing) (PRACTICALS)

Paper VIII	Part - I	100 Marks
-------------------	-----------------	------------------

1. Experiments to demonstrate some of physico-chemical processes like simple distillation, steam distillation, crystallization, Dialysis.
2. Preparation of Buffer solutions and Isotonic solution.
3. Determination of percentage composition of solution by specific gravity method.
4. Partition-coefficient, surface tension, viscosity.
5. Practical introduction to prescription, interpretation and labeling.
6. Dispensing of various dosage forms.

Second Year

PHARMACEUTICS-II (Industrial and Quality Control) (WRITTEN)

Paper I	Part – II	100 Marks
	<ol style="list-style-type: none">1. General introduction to the following processes and equipment used, Mixing, Size Reduction, Drying, Filtration, Evaporation, Compression, Rheology.2. A Brief introduction to the formulation and manufacturing of Solid, Semisolid, Liquid and Parenteral Dosage Forms.3. An introduction to the added substances like Preservatives, Antioxidants, Solubilizer, Suspending Agents, Buffers, Stabilizers etc.4. Filling, Packaging and various materials used for packaging.5. An understanding of Quality Control of Pharmaceuticals.6. Quality Assurance System adopted in Pharmaceutical Industry.7. Storage of Pharmaceutical and Packaging Materials.8. Documentation in Pharmaceuticals Industry.9. Study Tour: To visit various Hospital, Retail Pharmacies, Pharmaceutical Industries and Medicinal Plant collection will be an integral part of the syllabi.	

PHARMACOLOGY (WRITTEN)

Paper II

Part – II

100 Marks

1. Introduction to Pharmacology.
2. Routes of Drugs Administration.
3. Posology, Dose Calculations, Young's Formula and Clark's Formula, Factors modifying the action & dosage of drugs.
4. General introduction to the drugs action on various systems along with an explanation of one Prototype drug: -
 - (a) Autonomic Nervous System
 - (b) Central Nervous System
 - (c) Gastrointestinal Tract
 - (d) Respiratory System
 - (e) Cardiovascular System
5. Introduction to Autacoids and their Antagonists.
6. Introduction to Drugs used in Anesthetics.
7. Introduction to Chemotherapy.
8. Introduction to Toxicology.

PHARMACEUTICS-III (hospital and Community Pharmacy) (WRITTEN)

Paper III	Part – II	100 Marks
------------------	------------------	------------------

1. Pharmaceutical and Medical Terminologies used in Hospital and Community Pharmacy.
2. Introduction to Hospital Pharmacy.
3. Hospital and its Organization.
 - (i) Classification of Hospitals.
 - (ii) Clinical Department.
 - (iii) Nursing, Dietetic, Pathology, Blood Bank, Radiology and other supportive services etc.
 - (iv) Pharmacy's Role in the Hospital.
4. An introduction to the Hospital Formulary.
5. Dispensing to Inpatients and Outpatients.
6. Safe use of Medication in the Hospital.
7. Introduction to Distribution and Control of Hospital Medicines.
8. An introduction to Health Accessories and Surgical Supplies.
9. General Introduction to Community Pharmacy, Definitions and Background.
10. Public Health and Community Pharmacy:
 - (a) Epidemiology and its Control
 - (b) Preventive Health (EPI & CDC)
 - (c) Family Planning
 - (d) Health Policy & National Drug Policy
11. Patient Education and Counseling.
12. Pharmacy Layout Design
 - (a) Objectives
 - (b) Types of Pharmacies
 - (c) Consumer goods and purchases
 - (d) Classes of Layout designs
13. Management of Pharmaceutical and Hospital Waste

SOCIAL BEHAVIOUR, LAW AND ETHICS (WRITTEN)

Paper IV	Part – II	100 Marks
-----------------	------------------	------------------

1. An Introduction to Behavioral Sciences
 - (a) Principals of Social Behaviour
 - (b) Developmental stages of the life cycle
 - (c) Hereditary, Cultural and environmental influences on behaviour
 - (d) Mental Health and applied psychology

2. Importance of Communication Skills
 - (a) Principals of Verbal and Non-verbal Communication
 - (b) Recognition and response to verbal and non verbal communication
 - (c) Adaptations for Individualized needs
 - (d) Application of Electronic Technology
 - (e) Fundamental writing skills
3. Introduction to Law and Ethics
 - (a) Legal guidelines/requirements for Health Care
 - (b) Risk Management
 - (c) Pharmacy Law/Ethics and related issues
4. An Introduction to Manual Drug Laws
 - (a) Drug Act, 1976
 - (b) Pharmacy Act, 1967
 - (c) Punjab Drug Rules 2007
 - (d) The Dangerous Drug Act, 1930
 - (e) Shops and establishment Ordinance, 1969
 - (f) The Poisons Act, 1919
5. An Introduction to Management
 - (a) Promotion
 - (b) Advertising and Salesmanship
 - (c) Sales Management

COMPUTER

Paper V and VIII

Part – II

Total Marks : 100

Theory : 50

Practical : 50

1. Fundamentals basic concepts of computers
 - (a) General learning, knowledge and fluency with computer terms and usage.
 - (b) Disk
 - (c) Disk Operating Systems and Windows
 - (d) Computer language
 - (e) Modems and Networking
2. Preliminary Introduction of following packages
 - (a) PC Tools
 - (b) Norton Utilities
 - (c) Graphics
 - (d) Data Base
 - (e) Spread Sheet packages like Excel and Lotus
 - (f) Any one of popular word processor like Microsoft Word

3. Patient Data and Drug Data

(a) Record Keeping

(b) Data Analysis

PHARMACEUTICS (Industrial) (PRACTICALS)

Paper VI

Part – II

100 Marks

1. Manufacture of tablets by wet granulation, Manufacturing of tablets by slugging.
2. Manufacturing of Capsules.
3. Manufacturing of Syrup, Suspensions and Emulsions
4. Ampoule Filling, Sealing and sterilization
5. Quality Control Tests of Tablets
6. Disintegration, Dissolution, Friability, Hardness and Thickness tests, Determination of weigh Variation in tablets, Density of Powder, Particle Size Analysis.
7. Clarity and Leakage tests in Injectables.

NOTE: The candidates are required to work for 200 hours in a Hospital, Factory, Shop or Dispensary during summer vacation. They must maintain a diary of work signed daily by the Manager.

PHARMACOLOGY (PRACTICALS)

Paper VII

Part – II

100 Marks

1. Preparation of Standard Solution.
 - (a) Ringer Solution
 - (b) Tyrode Solution
 - (c) Krebs Solution
 - (d) Normal Saline Solution
2. To demonstrate the effects of Adrenaline and Acetylcholine on Frog's heart.
3. To study the effects of Adrenaline on Rabbit's Eyes.
4. To study the effects of Homatropine on Rabbit's Eyes.
5. To study the effects of Pilocarpine on Rabbit's Eyes.
6. To study the effects of Local Anesthetic Drug (e.g. Cocaine) on Rabbit's Eyes.
7. To study the anticoagulant effects of Heparin and Oral anticoagulants on Rabbit's Eyes.

13. *Distribution of Subjects and practicals for Part - I Examination*

The distribution of various subjects and practicals for the Part - I of the Examination for Registration in Register "B" shall be as specified in column (3) of the table below and the relevant examination paper number as specified in column (2) of the said table and the relevant marks for each paper as specified in column (4) thereof, namely: -

**TABLE (Part – I)
THEORY**

<i>Sr. No.</i>	<i>Paper No.</i>	<i>Description</i>	<i>Marks</i>
1.	I	Anatomy and Physiology	100 (20 + 80)
2.	II	Biochemistry & Microbiology	100 (50 +50)
3.	III	Pharmacognosy	100
4.	IV	Pharmaceutics-I	100

PRACTICALS

<i>Sr. No.</i>	<i>Paper No.</i>	<i>Description</i>	<i>Marks</i>
5.	V	Anatomy and Physiology	100 (20 + 80)
6.	VI	Biochemistry & Microbiology	100 (50 +50)
7.	VII	Pharmacognosy	100
8.	VIII	Pharmaceutics-I (General, Physical & Dispensing	100

14. *Distribution of Subjects and practicals for Part - II Examination*

The distribution of various theory subjects and practicals for the Part - II of the Examination for Registration in Register "B" shall be as specified in column (3) of the table below and the relevant examination paper number as specified in column (2) of the said table and the relevant marks for each paper as specified in column (4) thereof, namely: -

**TABLE (Part – II)
THEORY**

<i>Sr. No.</i>	<i>Paper No.</i>	<i>Description</i>	<i>Marks</i>
1.	I	Pharmaceutics-II (Industrial and Quality Control)	100
2.	II	Pharmacology	100
3.	III	Pharmaceutics-III (Hospital and Community Pharmacy)	100
4.	IV	Social Behaviour, Law and Ethics	100
5.	V	Computer	50

PRACTICALS

<i>Sr. No.</i>	<i>Paper No.</i>	<i>Description</i>	<i>Marks</i>
6.	VI	Pharmaceutics-II (Industrial and Quality Control)	100
7.	VII	Pharmacology	100
8.	VIII	Computer	50

Punjab Pharmacy Council Examining Body