

## ANATOMY & PHYSIOLOGY (WRITTEN)

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Paper I

Part- I

100 (20 + 80) Marks

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### Anatomy

1. Introduction to Anatomy
2. Anatomical Terminologies
3. Surface Anatomy

### Physiology

1. Introduction to Physiology
2. Structure of Cell and Tissues of the Body
  - i) Bone Structure, Types of Bones and Joints
  - ii) Muscles (Structure of Skeletal, Smooth & Cardiac Muscle)
3. BLOOD: Composition of blood (RBC, WBC and Platelets), Fate of Red Blood cells, Blood groups, Rh factors, E.S.R. Blood coagulation, Anaemias.
4. CIRCULATORY SYSTEM: Properties of the cardiac muscle. Heart beat. Cardiac cycle. ECG. Blood pressure. Pulse. Haemorrhage. Lymph.
5. RESPIRATORY SYSTEM: Mechanics of respiration. Pulmonary ventilation. Lungs volume and capacities. Carriage of O<sub>2</sub> and CO<sub>2</sub> by the blood. Regulation of breathing (Nervous & Chemical control).
6. SKIN: Structure, Functions of skin, Temperature regulation by Skin.
7. DIGESTIVE SYSTEM: Introduction to 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.
8. URINARY SYSTEM: Urine formation and composition of urine.
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 & MICROBIOLOGY (WRITTEN)

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Paper 2

Part- I

100 (50 + 50) Marks

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### BIOCHEMISTRY (50 marks)

- 1 General Introduction and Basic 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, Pyridoxal 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 Balance 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/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)**

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Paper 3

Part- I

100 Marks

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1. Introduction and scope of Pharmacognosy.
2. Classification of crude drugs.
3. Terminology used in Pharmacognosy.
4. Evaluation of crude drugs i.e. 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 e.g.  
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 plants containing:
  - a. Glycosides
  - b. Alkaloids
  - c. Volatile Oils (essential oils)
  - d. Resins and Resin combinations
  - e. Carbohydrates
  - f. Tannins
  - g. Lipids (fixed oils, fats and related compounds, waxes)

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

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Paper 4	Part- I	100 Marks
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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 to 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, Dessiccation, 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:  
Weights and Measures. Calculations for compounding and Dispensing. Containers and closures. Prescription-Handling, Filling, Interpretation. Labeling.
8. Extemporaneous Dispensing of Solutions, suspensions, 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 & PHYSIOLOGY (PRACTICAL)**

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Paper 5	Part- I	100 (20 + 80) Marks
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**Anatomy**

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

**Physiology**

1. Blood
  - i) Determination of Haemoglobin (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) Demonstration 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 Cuity for far vision and near vision.
  - ii) Field of vision (Perimetry).

**BIOCHEMISTRY AND MICROBIOLOGY (PRACTICALS)**

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Paper 6	Part- II	100 (50 + 50) Marks
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**BIOCHEMISTRY** (50 marks)

1. Qualitative analysis of Carbohydrates, Lipids and Sterols (Cholesterol), Blood analysis
2. Quantitative 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 microorganism.
4. Staining of Bacteria: Gram method
5. Microbiological analysis of air, water and soil.

**PHARMACOGNOSY (PRACTICALS)**

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Paper 7	Part- I	100 Marks
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1. Introduction of the entire and broken parts of the plant 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**

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Paper 8	Part - I	100 Marks
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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 %age composition of solutions by specific gravity method.
4. Partition-coefficient, surface tension, viscosity
5. Practical introduction to prescription, interpretation and Labeling.
6. Dispensing of various dosage forms.

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

Paper 1	Part- II	100 Marks
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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 Pharmaceutical Industry
9. **STUDY TOUR:**  
To visit various hospitals, retail pharmacies, pharmaceutical industries and medicinal plant collection will be an integral part of the syllabi.

**PHARMACOLOGY (WRITTEN)**

Paper 2	Part- II	100 Marks
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1. Introduction to Pharmacology:
2. Routes of drugs administration
3. Posology, Dose calculations, Yong's Formula and Clark's Formula, Factors modifying the action & dosage of drugs.
4. General introduction to the drugs acting on various systems along with an explanation of one Prototype drug:

- a. Autonomic Nervous System
- c. Gastrointestinal Tract
- e. Cardiovascular System

- b. Central Nervous System
- d. Respiratory System
- f. Genito-Urinary System

- 5. Introduction to Autacoids and their Antagonists
- 6. Introduction to Drugs used in Anaesthetics
- 7. Introduction to Chemotherapy
- 7. Introduction to Toxicology

**PHARMACEUTICS-III (Hospital and Community Pharmacy) (WRITTEN)**

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Paper 3	Part- II	100 Marks
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- 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 Departments
  - iii) Nursing, Dietetic, Pathology, Blood Bank, Radiology and other supportive services etc.
  - iv) Pharmacy's role in the Hospitals.
- 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 & its Control
  - b) Family Planning
  - b) Preventive Health (EPI & CDC)
  - c) Health Policy & National Drug Policy
- 11. Patient Education and Counselling
- 12. Pharmacy Layout Design:
  - a) Objectives
  - c) Consumer goods and purchases
  - b) Types of Pharmacies
  - d) Classes of Layout designs.
- 13. Management of Pharmaceutical and Hospital Waste

**SOCIAL BEHAVIOUR, LAW AND ETHICS (WRITTEN)**

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Paper 4	Part- II	100 Marks
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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 of Drug Laws
  - a. Drug Act 1976
  - b. Pharmacy Act 1967
  - c. Punjab Drug Rules 1988
  - d. The Dangerous Drugs 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**

<b>Paper 5</b>	<b>Part- II</b>	<b>Total Marks : 100</b>
		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 languages
  - (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/Drug Data
  - (a) Record keeping
  - b) Data Analysis

**PHARMACEUTICS (INDUSTRIAL) PRACTICALS**

<b>Paper 6</b>	<b>Part- II</b>	<b>100 Marks</b>
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1. Manufacture of Tablets by wet granulation. Manufacture of Tablets by Slugging.

2. Manufacturing of Capsules
3. Manufacturing of Syrups, Suspensions and Emulsions
4. Ampoule filling, sealing and sterilization
5. Quality Control Tests of Tablets  
Disintegration, Dissolution, Friability, Hardness and thickness tests, Determination of weight variation in tablets, Density of powder, Particle size analysis.
8. 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	7	Part- II	100 Marks
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1. Preparation of standard solution.
  - a. Ringer solution.
  - b. Tyrode solution.
  - c. Kreb 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 Anaesthetic drug (e.g Cocaine) on Rabbit's Eyes.
7. To study the anticoagulant effects of Heparin and oral anticoagulants on Rabbits.

**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

S. No.	Paper No.	Description.	Marks.
(1)	(2)	(3)	(4)
<b>SUBJECTS</b>			
1.	I	Anatomy and Physiology	100 (20+80)
2.	II	Biochemistry and Microbiology	100 (50+50)
3.	III	Pharmacognosy	100
4.	IV	Pharmacology and Toxicology	100
<b>PRACTICALS</b>			
5.	V	Anatomy and Physiology	100 (20+80)
6.	VI	Biochemistry and Microbiology	100 (50+50)
7.	VII	Pharmacognosy	100
8.	VIII	Pharmaceutics–I (General, Physical and Dispensing)	100

**13. Distribution of subjects and practicals for the 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**

S. No. (1)	Paper No. (2)	Description. (3)	Marks. (4)
<b>SUBJECTS</b>			
1.	I	Pharmaceutics-II (Industrial and Quality Control)	100
2.	II	Pharmaceutics-III (Hospital and Community Pharmacy)	100
3.	III	Pharmacology	100
4.	VI	Social Behaviour, Law and Ethics	100
5.	V	Computer	50
<b>PRACTICAL</b>			
6.	VI	Pharmaceutics-II (Industrial and Quality Control)	100
7.	VII	Pharmacology	100
8.	VIII	Computer	50

[No. 1-5/2001-PCP]

(Sher Ayub Khan)  
Deputy Secretary