ANATOMY AND PHYSIOLOGY (WRITTEN)

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, Anemia's.
4. Circulatory System
   Properties of the Cardiac Muscle, Heart Beat, Cardiac Cycle, ECG, Blood Pressure, Pulse, Hemorrhage, Lymph.
5. Respiratory System
   Mechanics of respiration, Pulmonary Ventilation, Lungs volume and capacities, Carriage of O₂ and Co₂ by the blood, Regulation of breathing (Nervous and Chemical Control).
6. Skin
   Structure, Functions of Skin, Temperature regulation by Skin.
7. Digestive System
   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.
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
Biochemistry (50 marks)


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.

   (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.
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).
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 Plant 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
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.


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.


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

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 (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.


Microbiology (50 marks)


2. Preparation of general and selective media and culturing of microorganisms.

3. Total and viable counts of microorganisms.


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.
### Paper I

<table>
<thead>
<tr>
<th></th>
<th>Part – II</th>
<th>100 Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>General introduction to the following processes and equipment used, Mixing, Size Reduction, Drying, Filtration, Evaporation, Compression, Rheology.</td>
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<td>3.</td>
<td>An introduction to the added substances like Preservatives, Antioxidants, Solubilizer, Suspending Agents, Buffers, Stabilizers etc.</td>
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<td>4.</td>
<td>Filling, Packaging and various materials used for packaging.</td>
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<td>5.</td>
<td>An understanding of Quality Control of Pharmaceuticals.</td>
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</tr>
</tbody>
</table>
| 9. | **Study Tour:**  
   To visit various Hospital, Retail Pharmacies, Pharmaceutical Industries and Medicinal Plant collection will be an integral part of the syllabi. |   |
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.
<table>
<thead>
<tr>
<th>Paper III</th>
<th>Part – II</th>
<th>100 Marks</th>
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</thead>
<tbody>
<tr>
<td>1. Pharmaceutical and Medical Terminologies used in Hospital and Community Pharmacy.</td>
<td></td>
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<tr>
<td>2. Introduction to Hospital Pharmacy.</td>
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<tr>
<td>3. Hospital and its Organization.</td>
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<tr>
<td>(i) Classification of Hospitals.</td>
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<tr>
<td>(ii) Clinical Department.</td>
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<td>(iii) Nursing, Dietetic, Pathology, Blood Bank, Radiology and other supportive services etc.</td>
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<tr>
<td>(iv) Pharmacy's Role in the Hospital.</td>
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<tr>
<td>4. An introduction to the Hospital Formulary.</td>
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<tr>
<td>5. Dispensing to Inpatients and Outpatients.</td>
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<tr>
<td>6. Safe use of Medication in the Hospital.</td>
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<tr>
<td>7. Introduction to Distribution and Control of Hospital Medicines.</td>
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<tr>
<td>8. An introduction to Health Accessories and Surgical Supplies.</td>
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<tr>
<td>9. General Introduction to Community Pharmacy, Definitions and Background.</td>
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<tr>
<td>10. Public Health and Community Pharmacy:</td>
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<tr>
<td>(a) Epidemiology and its Control              (b) Preventive Health (EPI &amp; CDC)</td>
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<td>(c) Family Planning                           (d) Health Policy &amp; National Drug Policy</td>
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<td>12. Pharmacy Layout Design</td>
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<tr>
<td>(a) Objectives                    (b) Types of Pharmacies</td>
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<tr>
<td>(c) Consumer goods and purchases    (d) Classes of Layout designs</td>
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<tr>
<td>13. Management of Pharmaceutical and Hospital Waste</td>
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</tbody>
</table>
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

   (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
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)

<table>
<thead>
<tr>
<th>Paper VI</th>
<th>Part – II</th>
<th>100 Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Manufacture of tablets by wet granulation, Manufacturing of tablets by slugging.</td>
<td></td>
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<tr>
<td>2. Manufacturing of Capsules.</td>
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<tr>
<td>3. Manufacturing of Syrup, Suspensions and Emulsions</td>
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<tr>
<td>4. Ampoule Filling, Sealing and sterilization</td>
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<tr>
<td>5. Quality Control Tests of Tablets</td>
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<tr>
<td>6. Disintegration, Dissolution, Friability, Hardness and Thickness tests, Determination of weigh Variation in tablets, Density of Powder, Particle Size Analysis.</td>
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<tr>
<td>7. Clarity and Leakage tests in Injectables.</td>
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</tbody>
</table>

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)

<table>
<thead>
<tr>
<th>Paper VII</th>
<th>Part – II</th>
<th>100 Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Preparation of Standard Solution.</td>
<td></td>
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<tr>
<td>(a) Ringer Solution</td>
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<tr>
<td>(b) Tyrode Solution</td>
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<td>(c) Kreb Solution</td>
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<tr>
<td>(d) Normal Saline Solution</td>
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<tr>
<td>2. To demonstrate the effects of Adrenaline and Acetylcholine on Frog’s heart.</td>
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<tr>
<td>3. To stuffy the effects of Adrenaline on Rabbit’s Eyes.</td>
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<tr>
<td>4. To study the effects of Homatropine on Rabbit’s Eyes.</td>
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<tr>
<td>5. To study the effects of Pilocarpine on Rabbit’s Eyes.</td>
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<tr>
<td>6. To study the effects of Local Anesthetic Drug (e.g. Cocaine) on Rabbit’s Eyes.</td>
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<tr>
<td>7. To study the anticoagulant effects of Heparin and Oral anticoagulants on Rabbit’s Eyes.</td>
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</tr>
</tbody>
</table>
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>
<thead>
<tr>
<th>Sr. No.</th>
<th>Paper No.</th>
<th>Description</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>I</td>
<td>Anatomy and Physiology</td>
<td>100 (20 + 80)</td>
</tr>
<tr>
<td>2.</td>
<td>II</td>
<td>Biochemistry &amp; Microbiology</td>
<td>100 (50 +50)</td>
</tr>
<tr>
<td>3.</td>
<td>III</td>
<td>Pharmacognosy</td>
<td>100</td>
</tr>
<tr>
<td>4.</td>
<td>IV</td>
<td>Pharmaceutics-I</td>
<td>100</td>
</tr>
</tbody>
</table>

**TABLE (Part – I)**

**THEORY**

**PRACTICALS**

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

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

### PRACTICALS

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