

**TWO YEARS POST MATRIC TEACHING
PROGRAM OF PARAMEDICS**

F. Sc. (OPHTHALMIC Technology)

**CURRICULUM WING
MINISTRY OF EDUCATION, ISLAMABAD**

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PREFACE

Live nations continue to develop. New fields emerge with the laps of time and pace of development. Medical Technology has gained importance with technological development in diagnostic, therapeutic, and preventive aspects of health care delivery system. This has produced a need for trained and skilled manpower in this field. Present curriculum is one of the outcomes of that necessity.

These curricula will not only help in providing a base for better healthcare but also decrease unemployment in our country. It will open up new avenues for our youngsters.

Curriculum development is a hectic task and is not possible in a day. Present curriculum also passed through many phases of development. Initially it was developed by consultants of Pakistan Institute of Medical Sciences on request of the then Project Director, College of Medical Technology, PIMS 1987.

In 1990, it was later on suggested by the faculty of the College of Medical Technology to bring it at par with F. Sc. The Committee of two members i.e. Dr. M.A. Aziz Shahzada and Engr. Sher Afzal Awan expanded it over a period of two years. The same curricula was revised and updated by Engr. Sher Afzal Awan in 1995.

In 1995, equivalence was granted by IBCC on continuous struggle for three years of Lt.Col. {r} Dr. Azra Javed. Qureshi, Principal, CMT.

The college approached Curriculum Wing, Ministry of Education in 2001 for approval and standardization. The process continued till to date. National Review Committee, constituted by the Curriculum Wing has discussed it in its meeting held from 18th May 2004 to 20th May 2004. The Committee has approved this draft.

Curriculum development is a continuous process. It may have many mistakes or it may be better than this. We have tried our best to update it so that trained people under this program may fulfill the needs and requirements of the hospitals in Pakistan.

This curriculum is first trail of its kind in Pakistan in the field of medical education. All our colleagues have made the history by taking part its preparation, review and approval. We do hope that both educationists and Paramedical Institutes will accept it. At last, we thank to Lt.Col.[r] Dr. Azra J. Qureshi, Mr. Sher Afzal Awan (PIMS) and Mr. Saeed Ahmad Meher (Curriculum Wing) for their valuable co-operation and contribution in completing this difficult task.

The Ministry of Education appreciates the contributions of all the Provincial Governments and Health Departments.

(Prof. Dr. Haroona Jatoi)
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ACKNOWLEDGEMENT

Grateful acknowledgement is hereby made to all the contributors from all provinces of Pakistan, from Ministry of Education and different hospitals at Federal area Islamabad who reviewed drafts of curricula of five disciplines and gave fruitful suggestions for its improvement.

Above all, I am indebted to Prof. Dr. Haroona Jatoi, Mr. Aurang Zeb Rehman and Mr. Saeed Ahmad Meher (Curriculum Wing) for their valuable co-operation and contribution in completing this difficult task.

My gratitude goes to Engr. Sher Afzal Awan, Registrar, CMT for his contribution in developing, updating, incorporating changes proposed by NRC and giving it a present shape.

I am also indebted to all the secretarial staff of Curriculum Wing and CMT for helping in clerical work. And above formal way of acknowledgement to past concerns, gratitude goes to all those who will use it in shaping the future of coming generations in the field of medical education.

I am also indebted to W.H.O.EMRO for its contribution in standardization of curricula for Paramedics Resource development in Pakistan.

(Col. Dr. Azra J. Qureshi)T.I.[M]
Principal,
College Of Medical Technology,
Pakistan Institute of Medical Sciences,
Islamabad.

Date:- 12th June,2004.

OBJECTIVES

The course for technician in ophthalmology is of two years duration. The objective of this course is to prepare the students for the assistance of the Ophthalmologist. They should acquire the basic knowledge of the following.

- a. The structure and function of the human eye.
- b. The Ophthalmology patient and his needs, specially in children.
- c. Principles of management, administration of an ophthalmic unit.
- d. Drugs used for ophthalmic disorders.
- e. The principles of management of ophthalmic operation theatre.

THE STUDENTS WILL BE TRAINED TO DEVELOP THE SKILL FOR :

- a. The management of the patient with eye disorders.
- b. Evaluating the effectiveness of the care given to the patient.
- c. The intelligent use of drugs.
- d. The management and administration of an ophthalmic unit and supervision of the staff working under him.
- e. Assisting the doctor in diagnostic tests and therapeutic measures related to eye diseases.
- f. Preparing the operation theatre.
- g. Assisting the Ophthalmic Surgeon in the operation theatre.
- h. Pre-operative and post-operative care of ophthalmology patients.
- i. Care of patients with medical disease of the eye.
- j. First aid treatment of ophthalmic emergencies in particular and other emergencies in general.

OPHTHALMIC TECHNOLOGY

Name of Subject	Theory / Practical	Topics Included	Marks
Basic Medical Sciences	Theory	Anatomy, Physiology, Public Health and First Aid	150
	Practical	As per above subjects through charts and models etc. only for anatomy and physiology	50
Ophthalmic Techniques	Theory	Anatomy and Physiology, Clinical Ophthalmology, Ophthalmic evaluation, Occular Surgery, Community and Preventive ophthalmology, Microbiology, Optics & Refraction	150
	Practical	As per above	100
Applied Sciences	Theory	Physics, Chemistry, Computer & Hospital Safety	100
	Practical	Physics, Chemistry related.	50

OPHTHALMIC TECHNOLOGY

Name of Subject	Theory / Practical	Topics Included	Marks
Part – I			
Basic Medical Sciences	Theory	Anatomy, Physiology.	75
	Practical	As per above subjects through charts and models etc. only for anatomy and physiology	25
Ophthalmic Techniques	Theory	Anatomy and Physiology, Ophthalmic evaluation, Community and Preventive ophthalmology, Microbiology	75
	Practical	As per above	50
Applied Sciences	Theory	Physics, Chemistry.	50
	Practical	Physics, Chemistry related.	25

OPHTHALMIC TECHNOLOGY

Name of Subject	Theory / Practical	Topics Included	Marks
Part – II			
Basic Medical Sciences	Theory	Public Health and First Aid	75
	Practical	First Aid and field visits for Public Health.	25
Ophthalmic Techniques	Theory	Clinical Ophthalmology, Occular Surgery, Optics & Refraction	150
	Practical	As per above	50
Applied Sciences	Theory	Computer & Hospital Safety	75

OPHTHALMIC TECHNOLOGY

PART - I

HOURS DISTRIBUTION PER WEEK

S.No.	Subject	Theory	Practical	Total
1	OPHTHALMIC Technique-I	06	06	12
2	Basic Medical Sciences – I	03	03	06
3	Applied Sciences – I	02	01	03
4	English – I	06	-	06
5	Urdu – I	06	-	06
6	Islamic Studies	01	-	01

HOURS DISTRIBUTION PER YEAR

S.No.	Subject	Theory	Practical	Total
1	OPHTHALMIC Technique-I	240	240	480
2	Basic Medical Sciences – I	120	120	240
3	Applied Sciences – I	80	40	120
4	English – I	240	-	240
5	Urdu - I	240	-	240
6	Islamic Studies	40	-	40
		960	400	1360

PART– II

HOURS DISTRIBUTION PER WEEK

S.No.	Subject	Theory	Practical	Total
1	OPHTHALMIC Technique-II	06	09	15
2	Basic Medical Sciences – II	02	01	03
3	Applied Sciences – II	02	01	03
4	English – II	06	-	06
5	Urdu – II	06	-	06
6	Pak Studies	01	-	01
		23	11	34

HOURS DISTRIBUTION PER YEAR

S.No.	Subject	Theory	Practical	Total
1	OPHTHALMIC Technique-II	240	360	600
2	Basic Medical Sciences – II	80	40	120
3	Applied Sciences – II	80	40	120
4	English – II	240	-	240
5	Urdu – II	240	-	240
6	Pak Studies	40	-	40
		920	440	1360

APPLIED SCIENCES
PART – I

PHYSICS AND CHEMISTRY

1. The nature of Science, Divisions of Science, and Scientific method.
2. The Measurement – Metric System, scientific notation, units of mass, length and volume.
3. Mechanics – Force, equation of motion, laws of motion.
4. Gravity – speed, velocity and acceleration, center of gravity, weight and mass.
5. Work, Power, Energy.
6. Simple machines – principles of machines, friction, levers.
7. Density, Specific gravity, Archimedes's Principle.
8. Pressure – Definition, pressure in hydrostatic fluids, pressure in flowing liquids.
9. Gas Laws – Boyle's and Charles laws, gas laws applicable to respiratory process, effects of changes in atmospheric pressure on physiology of the human body.
10. Heat – nature and measurement, effects of heat, methods of transfer.
11. Light – Transmission, reflection and refraction of light, lenses.
12. Sound – How it is produced, characteristic, transmission, reflection of sound, echoes, ultrasound.
13. Electricity – Atomic structure, free electrons, conductor and insulators, Definition of current, P.D., Resistance, Resistance laws, Ohm's law, circuit, series circuit, parallel circuit, Power and energy.
14. Magnets and Magnetism – Properties, magnetic field, magnetic lines of force, electromagnet, magnetic effect of electric current, Motor and generator effect of current, magnetic and electric induction, Transformer.
15. Charge – Coulomb's law, capacitor and capacitance, capacitor in series and in parallel.
16. A.C. Definition, RMS value, Peak value Sine wave.
17. Electromagnetic Radiation – Spectrum, ionization, excitation, Inverse Square law, frequency, wave length, terms and their definitions.
18. Composition of Substance – Atoms and molecules, symbols, formulae, Elements and compounds, chemical formula.
19. Chemical Reactions and Equations.
20. Water – physical and chemical properties, Deliquescent, efflorescent, hygroscopic substances, solvent properties, Hydrolysis, Water cycle, impurities, hard and soft water.
21. Solutions – Terms, Solubility, Concentrations, dilutions, properties of solution.
22. Acid, Bases, and salts.
23. pH Scale and buffer system.
24. Electrolytes and electrolysis.
25. Amines and amides
26. Proteins – compositions, properties of amino acids, classifications.
27. Carbohydrates
28. Lipids

Practical Chemistry

1. How a wash bottle is prepared?
2. To purify the given sample of impure naphthalene by crystallization.
3. To purify the given sample of naphthalene by sublimation.
4. To determine the melting & boiling point of organic compound.
5. To prepare the standard solution of acid or Base.
6. To prepare a standard solution of oxalic acid and with its help standardize a solution of NaOH.
7. To prepare approximate N/10 solution of H_2SO_4 determine its exact normality by titrating it against standard N/10 NaOH?
8. To standardize a given solution by direct method.
9. To standardize a given solution by indirect method.

Practical Physics

- a. To find the unknown force.
- b. To find the center of gravity of an irregular shape.
- c. To verify the law of reflection.
- d. To find the path of light passing through a prism.
- e. To find the focal point of a lens.
- f. Determine the critical angle of glass using a glass prism.
- g. Determine the focal length of convex lens.
- h. To find the refractive index of a liquid using a concave mirror.
- i. Determine the speed of sound at a room temperature.

APPLIED SCIENCES
PART - II

APPLIED COMPUTER SCIENCES

Note: This is an introduction to computer science. A brief description and definitions of terms will be taught to the students.

1. An over view of Computer system.
2. The shapes of computer today – Super Computer, Main frame mini computer, Works stations and PC.
3. Input methods – Key board, Mouse,
4. Alter native methods of input – hand devices, optical devices, Audio-visual input devices.
5. Monitors and sound system – Monitors – PC. Projectors, sound system.
6. Printer and brief introduction to its types.
7. Transforming data in to information.- representation , process , speed etc.
8. CPU – types with definition
9. Types of storage devices – Magnetic and optical.
10. Measuring drive information- access time, file compression, transfer rate, interface standard.
11. Basic of operating system – interface, programme, files, hardware and software management
12. Definitions of Unix, DOS, Macintosh operating system, Windows, OS / 2, Windows NT, 95, 98, 2000, Linux.
13. Words processing and Desk tope Publishing software.
14. Spread sheet software.
15. Presentation programme
16. Data base management System.
17. Networking basics – brief of use, structure, LANs, Media, Hardware and Software.
18. Networking – Standard telephone lines, digital lines, Network in the home.
19. Internet basics
20. Accessing, connecting, working on internet, introduction to DICOM, PACS.
21. Working with images.
22. Graphics software.
23. Understanding multi-media.
24. Creating and distributing media contents.
25. Basics of information system- Use, Parts.
26. Building information system – five phases – need, Design, development, implementation, maintenance.
27. Creating programmes – definitions of programme and approaches.
28. Programming languages and system development life cycle.
29. Ergonomics, health and privacy issues.
30. Brief of computer crimes, Viruses, Theft and computer environment

PATIENT SAFETY

1-10 Electrical Hazards.

- Electrical current and body muscles
- Electric shock
- Defibrillators
- Pace makers
- High and low frequency electricity in medicine
- Classification of medical equipment
- Degree of protection in equipment
- Earth leakage current
- Maximum current limits and safety tests

11-15 Fire and explosion in hospitals

- Inflammable gases and liquids
- Static electricity
- Precaution against fire and explosion

16-26 Surgical diathermy and other possible hazards in hospitals

- Surgical diathermy and precautions
- Mechanical hazards
- Heat and light hazards
- Chemical burns

27-35 Radiation

- Non-ionizing radiation
- Ionizing radiation
- Microwave ovens
- Ultrasound therapy equipment
- Lasers

36-40 Infection in hospitals

- The hospital environment
- Pathogenic, non-pathogenic microorganisms
- Modes of spread of infection
- Kinds of infection
- Cross-infection
- Precautions and prevention.

BASIC MEDICAL SCIENCES
PART - I

ANATOMY

The depth of the subject will only be diagram and labeling of the diagram.

Week	Contents
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1. Introduction

2-3. The study of human cell and functions of organelles, Nucleus, DNA helix, RNA, genetic code, Chromosomes.

Cell Division

Mitosis and Meiosis of cell

4-9. BASIC TISSUES

- Different Types of tissues.
- Connective tissues.
- Epithelial tissues.
- Muscle tissues.
- Nervous tissues.
- Blood tissues.

10-11. The **circulatory system**- Structure of heart. Different chambers of heart, main arteries arising from the heart and main veins of the heart, branches of arch of aorta, Thoracic aorta, abdominal aorta, main vessels of upper and lower limbs.

12-13. Lymphatic System

14-17. The Gastro Intestinal Systems

- Mouth
- Pharynx
- Esophagus
- Stomach
- Small Intestine
- Large Intestine
- Accessory organs (Liver, Spleen, Pancreas & Gall Bladder)

18-20. Respiratory System

1. Organs of respiration
2. Upper respiratory tract
3. Lower respiratory tract

21-22. The Skin

- Epidermis
- Dermis
- Sebaceous glands
- Nails

23-25. The Nervous System

1. CNS central nervous system
2. Peripheral Nervous System
 - Different parts of nervous system
 - Structure of cerebrum, mid brain, cerebellum, pons and medulla oblongata, spinal cord and
 - Autonomic nervous system

26-28. The Endo Crine Glands

Short description and position of:-

- Pituitary gland
- Thyroid gland
- Parathyroid gland
- Adrenal gland
- Hormones of Testis
- Prostate
- Ovaries
- Pancreas and Thymus

29-31. The urinary system

Structure of kidney, urethra, urinary bladder, prostate gland and ureter. Difference of right and left kidneys.

32-33. The Reproductive System

- Male reproductive system
- Female Reproductive System
- Different organs of male reproductive system, structure of testis, the scrotum, seminal vesicles, prostate gland, the penis and urethra.
- Different organs of females reproductive system, Mammary glands, Structure of ovaries, uterus, cervix and vagina,

34-35. The Skeleton

Different bones of skull. Bones of upper limbs, lower limbs, thorax, pelvis and vertebral column.

36-38. Structure of individual bones, scapula, humerus, radius, ulna, femur, tibia and hip bones, hands, foot, ribs, sternum, clavical, sacrum, thyroid, hyoid, */

The Joints

1. All joints and their movements
2. Main muscles of body.

39-40. The Special Senses:

Brief anatomy of eye. Three coats of eye ball. Brief anatomy of ear Outer, middle and inner ear, nose- inner and outer, tounge, salivary glands, skin.

Recommended Books:

Foundations of anatomy and physiology by Kathleen J.W. Wilson.

PHYSIOLOGY

The physiology of the following topics will consist of brief description of the function of part of the body.

1-3. **The cell and its functions**

1. Structure and Functions of a human cell

The cytoplasm and its organelles

Comparison with animal cell

Functional system of the cell

2. Endocytosis & Phagocytosis

Ingestion and digestion by the cell

Functions/Structures of Golgi apparatus

3. Cell Division

Mitochondria and reticulum.

Cell reproduction.

4-9. **Tissues and fluids of body.**

10-11. **Cardiovascular system (Heart and circulation)**

Description of Heart and vessels (arteries, vein, and capillaries)

Cardiac cycle, diastole and systole

Functions of atria and ventricles

Functions of valves

Heart pumping (work output of heart)

Cardiac output, stroke volume etc.

Heart sounds

Lymphatic system function

12-14. **Respiratory System**

Basic mechanism of respiration

Inspiration expiration mechanism

Pulmonary capacities and pulmonary volumes

Respiratory rate and tidal volume definitions

Functions of respiratory pathways (Chemical & Neural Control)

Artificial respiration, mouth breathing

Transport of oxygen and carbon dioxide in the blood and body fluids

15-18. **Gastro intestinal tract.**

Ingestion of food, mastication (Chewing)/ Digestion and Swallowing

Functions of stomach

Storage function, mixing of food

19-20. **Secretions of GIT**

Saliva, Salivary glands functions of

Saliva, Gastric Secretion, Functions of

Pancreatic secretion, Bile secretion and its function

Secretions of the small intestine, secretion of large intestine, Digestion and absorption of food

21-25. Metabolism

Introduction to Fat and Protein Metabolism

Introduction to Carbohydrates Metabolism, Role of glucose in Carbohydrate metabolism, Transport of glucose in body tissue, Lipid metabolism transport of lipids in the blood.

Transport from the GIT, and fat deposits, Proteins metabolism, basic properties of protein, use of proteins for energy, Vitamins and their metabolic role.

27-28. Endocrine Glands.

Endocrine glands and their hormones

The pituitary hormones and their functions

The thyroid hormone, The adrenocortical hormones

Parathyroid hormones and their functions

29-32. Reproductive System.

Functions of the male reproductive organs

Functions of the female reproductive system

Testosterone and other male sex hormones

Pregnancy, lactation and female hormones

33-37. Special Senses

Introduction to Sensory organs and their function

The eye functions and elements of eye, Sclera, choroid retina, The eye as a camera, Sense of Hearing, tympanic membrane and external ear, middle ear and vesicles, Internal ear and its functions

Conduction of sound to the cochlea

The functions of Tongue and salivary glands.

The functions of nose and tonsils / Adenoids.

The functions of skin and its appendages

38-40. Nervous System

General design of nervous system types and parts of nervous system Functions of brain, cerebrum cerebellum spinal cord. Cranial nerves. Autonomic nervous system (Parts and functions)

BASIC MEDICAL SCIENCES
PART – II

FIRST AID

1. First Aid

- Definition
- Principles
- Actions at emergency

2. Dressing + Bandages
3. Short structure & function of respiratory system
4. Asphyxia
5. Assisted respiration
6. Short structure and function of C.V.S.
7. Shock (Circulatory failure) Patho-Physiology
8. Cardiogenic shock Treatment
9. Hypo-volumic shock (Haemotologic) with treatment other condition.
10. Anaphylactic shock
 - Signs
 - Symptoms
 - Treatment
11. Septic Shock "
12. Neurogenic shock "
13. Cardiopulmonary resuscitation principles practical demonstration.
14. Assessment of newborn
15. Resuscitation of newborn
16. Short structure & function of locomotive, Sprains and strains
17. Fractures, First Aid Management
18. Burns, Scalds causes and First Aid Management
19. Wounds cuts stabs and management
20. Management of Bleeding from wound/NOSE/mouth/misc.
21. Drowning-First Aid management
22. Road traffic accidents (First Aid Management)
23. Transport of injured persons especially spinal care
24. Care of Coma / stupor unconscious victim
25. Poisonings-Swallowed persons and first aid management
26. Poisonings inhalation poisonings first aid management
27. Bites Stings management human, cat dog insect
28. Snake bite and first aid management
29. Anaphylactic Shock and its management
30. Choking (Foreign body in airway)
31. Abdominal pain (First aid)

32. Sport injuries
33. Safety at home precautions / safety
34. Precautions at kitchen to avoid accidents.
35. Precautions at bathroom
36. Precautions in living room
37. Precautions at stairs and at terraces

PUBLIC HEALTH

1. **Introduction:** To health field, definition of health, preventive, social, community and family medicine.
2. Health care organization in Pakistan.
 - i. General introduction to federal, provincial, divisional and district level organizational structure.
 - ii. Role of paramedics in hospitals.

3-6. AIR

Composition and functions-Pollution and pollution indicators-impurities in air-cleaning methods (an over view)

7-12. WATER

Sources of water with special reference to Pakistan. Impurities-Safety-Purification, Natural and artificial methods.

13-17. VENTILATION

Objectives and merits. Over crowding and its effects on human body. Natural ventilation and artificial ventilation.

18-25. Wastage

Introduction-refuse and its collection. Methods of collection and disposal of refuse-Excreta-Methods of collection and disposal of Excreta.

26-27. Infection and disinfecting

Introduction-Terminology-Methods of disaffection.

28-29. Sources of infection-routes of transmission i.e., air, water and food.

30-39. Communicable diseases

Introduction-EPI and diseases related to it, vaccination schedule.

Communicable diseases like T.B., diphtheria, tetanus, polio, whooping cough and measles Epidemiology and prevention methods for above diseases.

40. Family Planning

Need and objectives-general methods.

OPHTHALMALIC TECHNIQUES

PART – I

FIRST AID

First aid treatment of all types of medical and surgical emergencies in addition to ocular emergencies such as follows:-

First Aid Management of Ocular Emergencies

- a. Removal of corneal foreign body
- b. Penetrating Injury of the Eye ball
- c. Laceration of the cornea
- d. Injuries of the eye lid
- e. Chemical Injuries of the eye
- f. Thermal Trauma
- g. Drug reactions
- h. Acute Congestive Glaucoma
- i. Retinal Detachment
- j. Acute Uveitis

MICROBIOLOGY

1. Introduction to micro-organisms
2. Classification of Bacteria
3. Structure and reproduction of bacteria
4. Characteristic of Rickettsiae
5. Transmission and diseases caused by Rickettsiae
6. Prevention and control of Rickettsiae
7. Characteristic of Chlamydiae
8. Transmission and diseases caused by Chlamydiae
9. Treatment, prevention and control
10. Characteristics of Spirochetes
11. Transmission, prevention and control
12. Diseases caused by Spirochetes
13. Composition and structure of Virus
14. Classification of Virus
15. Mode of Transmission and common diseases caused by Virus
16. Prevention and control
17. Characteristics of Protozoa
18. Biology and diseases caused by Protozoa
19. Prevention and control
20. Characteristics and reproduction of Fungi
21. Diseases caused by Fungi with reference to O.T.
22. Control and prevention
23. Sterilization and disinfection.
24. Introduction to Immunity and Immunology
25. Acquired Immunity and resistance factors
26. Methods of environmental cleanliness.
27. How to keep instruments, equipment's and other things bacteria free.
28. A brief introduction to Necrosis, Cell death, Inflammatory reaction, Hypersensitivity and Neoplasm.

OPHTHALMIC EVALUATION:

- a. Symptomatology of eye diseases
- b. Eye examination.
- c. History.
- d. Distant and close visual acuity.
- e. External examination.
- f. Use of the perimeter, Jerrum screen.
- g. Basis of FFA, Ultra sound.
- h. Measurement of IOP.
- i. Staining of Cornea.
- j. Syringing of lachrymal apparatus.

PREVENTIVE OPHTHALMOLOGY

- a. Common causes of total and partial blindness and their prevention e.g. Trachoma, Ophthalmic neonatorum, chronic simple glaucoma, vitamin A deficiency, Cataract and retinal detachment.
- b. Prevention of ocular injuries in industrial workers and radiant injuries.
- c. Prevention of amblyopia in children.
- d. Prevention of ocular diseases.
- e. A brief introduction to LASER and its uses in Ophthalmology. Special are of children with:
 - a. Ophthalmic diseases.
 - b. Ophthalmic care in school children.

LIST OF PRACTICALS

Ocular Emergencies Practical

Practical-1: Removal of conjunctival Foreign Body

- Indication
- Apparatus
- Procedure
- Results
- Precautions

Practical-II: First Aid Management of Ocular Emergencies

- k. Removal of corneal foreign body
- l. Penetrating Injury of the Eye ball
- m. Laceration of the cornea
- n. Injuries of the eye lid
- o. Chemical Injuries of the eye
- p. Thermal Trauma
- q. Drug reactions
- r. Acute Congestive Glaucoma
- s. Retinal Detachment
- t. Acute Uveitis

The student will have to cover following points for each of above and other eye emergencies / diseases:-

- Apparatus
- Procedure
- Results
- Precautions

Practical-III: Instillation of Eye Drops

- . For Treatment
- . For Anaesthesia
- . For Diagnostic Purpose
- . In Post Operative Cases

- Indication
- Apparatus
- Procedure
- Results

- Precautions
- Ophthalmic Evaluation/Community Ophthalmology

The students will have to do these two jobs in addition to following practicals:-

- To prepare community based messages for general Eye care
- To pick 50 cases from community with common eye problems, evaluation and management of these cases.

Practical-I

- **Perimetry:**
 - Indications
 - Types
 - Apparatus
 - Procedure
 - Precautions
- **Ophthalmoscopy:**
 - Indication
 - Types
 - Apparatus
 - Procedure
 - Precautions
- **Tonometry:**
 - Indications
 - Types
 - Apparatus
 - Procedure
 - Precautions
- **Biometry:**
 - Indications
 - Apparatus
 - Procedure
 - Precautions
- **Corneal Staining:**
 - Indications
 - Apparatus
 - Procedure
 - Precautions
- Eversion of Upper Eyelid
- Fluroscein Angiography
 - Indications
 - Apparatus
 - Procedure
 - Precautions

OPHTHALMALIC TECHNIQUES

PART – II

ANATOMY OF THE HUMAN EYE

A brief description of the human eye including the study of the followings:

- a. Orbit.
- b. The eye lids.
- c. The lachrymal apparatus.
- d. The conjunctiva.
- e. The anterior chamber.
- f. The cornea.
- g. The sclera.
- h. Iris, ciliary body and pupil.
- i. The lens.
- j. The choroids
- k. The vitreous.
- l. The retina.
- m. The optic nerve and optic pathway, visual cortex.
- n. Extra ocular muscles and their actions.

OPTICS AND REFRACTION

- a. Principles of optics and their application in ophthalmology.
- b. Properties of light.
- c. Concept of refraction, reflection and refractive index.
- d. Types of lenses, prisms and mirror and image formation.
- e. Concept of focal length and refractive power (diopter).
- f. Common errors of refraction.
- g. Principles of refraction.
- h. Correction of errors of refraction.
- i. Optics of ophthalmic instruments.
- j. Equipment related to Optics and Refraction like Ophthalmoscope, Perimeter, Tonometer, autorefractor, and Slitlamp

OPTICS

Chapter-1

Reflection & refraction laws of reflection & refraction, regular and irregular reflection and their examples Real and virtual images

Chapter-2 Mirrors

Convex & Concave mirrors their types, focus, centre of curvature & role of the mirror, focal length & centre of curvature of the mirror.

Ray diagram of concave & convex mirror. Image diagram of concave & convex mirror. Different problem for finding the focal length image position or object position from the mirror.

Chapter-3 Lenses

Convex & concave large their types, different terms like focus, focal length, principal axis, centre of curvature, radius of curvature focal & aperture of the lens formula, different problem on lens formula for finding out

- i. Position of the object
- ii. Position of the image
- iii. Size of the object or image
- iv. Magnification of the Lens

Chapter-4 Defects of Eye

- i. Comparison of camera & eye
- ii. Dispersion of light from critical angle
- iii. Angle of deviation.

PRINCIPLES OF OCULAR SURGERY

- a. Sterilization.
- b. Instruments their usage and care.
- c. Method of Assistantship.

- d. Behavior in the operation theatre.
- e. Maintenance of instruments in the O.T and OPD
- f. Preoperative and postoperative care of the ophthalmic patients.
- g. Hospital acquired infections and their prevention.

CLINICAL OPHTHALOMOLOGY

A brief description of the following disease and nursing care, of patients with eye disorders.

- a. Glaucoma-measurement of IOP (Tonometry).
- b. Ocular injuries:
 - i. Burns.
 - ii. Mechanical injuries.
 - iii. Laceration of the eyelids.
 - iv. Foreign bodies.
 - v. Injuries of the conjunctiva.
 - vi. Abrasions and superficial lesions of the cornea.
 - vii. Perforating injuries of the eyeball.
 - viii. Contusions of the eye ball.
 - ix. Orbital injuries.

DISEASES

- c. Diseases of Lid.
- d. Diseases of conjunctiva.
- e. Diseases of cornea.
- f. Diseases of uveal tract.
- g. Diseases of Lens (cataract).
- h. Diseases of Lachrymal apparatus.

PHARMACOLOGY

- a. Methods of drugs delivery to the eye.
- b. Mode of action of drugs.
- c. Side effects and contra indications.

- d. A brief review of the following classes of drugs.
 - i. Local anesthetics used in ophthalmology
 - ii. Drugs used in glaucoma.
 - iii. Mydriatics and cycloplegics.
 - iv. Anti-infective ophthalmic drugs.
 - v. Diagnostic eye solution.
 - vi. Lubricants and artificial tears.

LIST OF PRACTICALS

Ocular Surgery

- Preparation of Operation Theatre for common Ocular Surgery
 - CATRACT
 - CHALAZION
 - SYRINGING
 - DACRYOCYSTEATOMY
 - GLAUCOMA
 - EPILATION
 - STRABISMUS

OPTICS/REFRACTION

Practical-I: To diagnose common error of refraction & Management in:-

- MYOPIA
- HYPERMETROPIA
- ASTIGMATISM
- PRESBYOPIA
- ANISOMETROPIA
- EMETROPIA
- COLOURED VISION

Practical-II Retinoscopy

- INDICATION
- APPARATUS
- PROCEDURE
- PRECAUTION

Practical-III Visual Acuity

- INDICATION
- APPARATUS
- PROCEDURE
- PRECAUTION

Optics

1. To verify the laws of reflection
2. To verify the laws of refraction.
3. To find the position of an image when the position of an object from specific mirror is given.
4. To find the different position of the image of object from a convex lens.
5. To determine the position of an object from a lens, by adjusting the position of a lens.

Surgery and OPD

1. O.T. Instruments
 - i. Speculum
 - ii. Eorueal Scissors
 - iii. Needle Holders
 - iv. Hooks
 - v. Conjunctival Scissors
 - vi. Cautry
 - vii. Knife with blades
 - viii. Iris Reponsters
 - ix. Stiches 10,80, silk 40
 - x. SIMCOR Cannula
 - xi. IOLs
 - xii. Visco Elasties
 - xiii. Muscles retractors
 - xiv. Care of Microscopes & bulbs.
2. OPD
 - a. Measurement of Vision
 - b. Snellen's test charts for distant vision and for near vision
 - c. Color Vision Charts
3. **Glaucoma Tests**
 1. Field of Vision
 2. Schiotz Tonometer
 3. Casual Staring
4. **Dressing and Bandages**
 - a. How to put drops.
 - b. How to apply eye bandage
 - c. How to care FBs in eye.

Book Recommended

- a. Book of Ophthalmology by Chatterjee.
- b. Parson's Diseases of the Eye

**WEIGHTAGE OF VARIOUS SECTION OF THE SYLLABUS
PART - I**

S.No	Subject	Part / Class	Section	Weightage	Total Marks
1	Basic Medical Sciences (Anatomy & Physiology)	XI	I – Cell, Basic Tissue, Lymphatic System, Skin, Special Senses. II – GIT, Respiratory System, Cardiovascular System, Skeletal System & Joints. III – Nervous System, Reproductive System, Urinary System, Metabolism.	33 % 33% 33%	75
	Practical				25
2	Applied Sciences (Physics & Chemistry)	XI	Physics I – (1-4) Science, Measurement, Mechanic & Gravity. II – (5-8) Work & Energy, Machines, Density, Pressure. III – (9-11) Heat, Light & Sound IV – (12-14) Electricity and Magnetism V – (16) Electromagnetic Radiation Chemistry VI – (17- 19) Composition, Reactions, Gas Laws VII – (20-21) Water & Solutions VIII – (22-24) Acid, pH, Electrolytes IX – (25-28) Amines, Proteins, Carbohydrates, Lipids.	50 % 10 % 10 % 10 % 10 % 10 % 50 % 10 % 10 % 10 %	50
	Practical		As per list given		25
3	Ophthalmic Techniques – I	XI	I – First Aid II – Microbiology III – Ophthalmic Evaluation IV – Preventive Ophthalmology	20 % 30% 25% 25%	75
	Practical		Some as above		50
4	English	XI	As per approved syllabus for HSSC – I		100
5	Urdu		As per approved syllabus for HSSC – I		100
6	Islamiyat		As per approved syllabus for HSSC – I		50

WEIGHTAGE OF VARIOUS SECTION OF THE SYLLABUS
PART - II

S.No	Subject	Part / Class	Section	Weightage	Total Marks
1	Basic Medical Sciences (First Aid & Public Health)	XII	I – Topic 1, 2, 33 – 37 (First Aid), Topic 1 & 2 (Public Health)	25 %	75
			II – FA Topics 7 – 15, 18, 21 – PH Topics 3 – 17 & 40	25%	
			III – FA Topics 17, 20, 22, 23, & 32 -- PH Topics 18 -27	25%	
			IV – FA Topics 24 –26, 29 – 31 – PH 30 – 39	25%	
				25%	
	Practical		Same as above		25
2	Applied Sciences (Computer & Patient Safety)	XII	Computer	50 %	75
			I – Topics 1- 6	10 %	
			II – Topics 7 - 12	10 %	
			III – Topics 13 – 18	10 %	
			IV – Topics 19 – 24	10 %	
			V – Topics 25 – 30	10 %	
			Patient Safety	50 %	
			VI – Electrical Safety	20 %	
			VII – Fire and Explosion	02 %	
			VIII – Surgical Diathermy	08 %	
			IX – Radiation Safety	15 %	
X – Infection in Hospital	05%				
3	Ophthalmic Techniques - II	XII	I – Clinical Ophthalmology	20 %	75
			II – Special Anatomy	30%	
			III – Pharmacology	10%	
			IV – Optics and Refraction	20%	
			V – Principles of Ocular Surgery	20%	
	Practical		Same as above		50
4	English	XII	As per approved syllabus for HSSC – I		100
5	Urdu	XII	As per approved syllabus for HSSC – I		100
6	Pak Study	XII	As per approved syllabus for HSSC – I		50