

HAFEEZ INSTITUTE OF MEDICAL SCIENCES PESHAWAR



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F.SC OPHTHALMOLOGY 1ST YEAR

S.No	Subject/Papers	Course	Marks	
1.	English – II	According to BISE Peshawar	Theory 100	Practical Nil
2.	Urdu – II	According to BISE Peshawar	100	Nil
3.	Pak Study	According to BISE Peshawar	50	Nil
4.	Basic Medical Sciences Anatomy & Physiology	Teacher Lecture Notes	75	25
5.	Applied Sciences Physics & Chemistry	Teacher Lecture Notes	75	25
6.	Ophthalmic Techniques –I	Teacher Lecture Notes	75	25

Grand Total= 475 + 75 = 550

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PAPERS:- APPLIED SCIENCES (PHYSICS & CHEMISTRY)

Physics

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 Magnets – 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

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

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- h. To find the reflective index of a liquid using a concave mirror
- i. Determine the speed of sound at a room temperature



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PAPERS:- APPLIED SCIENCES (PHYSICS & CHEMISTRY)

Chemistry

1. Composition of Substance – Atoms and molecules, symbols, formulae, Elements and compounds, chemical formula
2. Chemical Reactions and Equations
3. Water – Physical and Chemical properties, Deliquescent, efflorescent, hygroscopic substances, solvent properties, Hydrolysis, Water cycle, impurities, hard and soft water
4. Solution – Terms, Solubility, Concentrations, dilutions, properties of solution
5. Acid, Bases, and Salts
6. pH Scale and buffer system
7. Electrolytes and electrolysis
8. Amines and amides
9. Proteins – compositions, properties of amino acids, classifications
10. Carbohydrates
11. Lipids

Practical Chemistry

1. How fitting up a wash bottle is prepared?
2. To pacify the given sample of impose naphthalene crystallization
3. To pacify 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 exotic acid and with its help standardize a solution of NaOH
7. To prepare approximates 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

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PAPERS:- BASIC MEDICAL SCIENCES (ANATOMY & PHYSIOLOGY)

Anatomy

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

Introduction

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

Cell Division

Mitosis and Meiosis of cell

BASIC TISSUES

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

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.

Lymphatic System

The Gastro Intestinal Systems

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

Respiratory Systems

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

The Skin

1. Epidermis
2. Dermis
3. Sebaceous glands
4. Nails

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The Nervous System

1. CNS central nervous system
2. Peripheral nervous system
 - i. Different parts of nervous system
 - ii. Structure of cerebrum, mid brain, cerebellum, Pons and medulla oblongata, spinal cord and
 - iii. Autonomic nervous system

The Endocrine Glands

Short Description and position of:-

- a. Pituitary gland
- b. Thyroid gland
- c. Parathyroid gland
- d. Adrenal gland
- e. Hormones of Testis
- f. Prostate
- g. Ovaries
- h. Pancreas and Thymus

The urinary system

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

The Reproductive System

- a. Male reproductive system
- b. Female reproductive system
- c. Different organs of male reproductive system, structure of testis, the scrotum, seminal vesicles, prostate gland, the penis and urethra
- d. Different organs of female are reproductive system, Mammary glands, structure of ovaries, uterus, cervix and vagina.

The Skeleton

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

Structure of individual bones, scapula, humerus, radius, ulna, femur, tibia and hip bones, hands, foot, ribs, sternum, clavicle, sacrum, thyroid, hyoid cricoids.

The Joints

All joints and their movements
Main muscles of body

The Special Senses:

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

Recommended Books:

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



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Subject/Papers Basic Medical Sciences (Anatomy & Physiology)

Physiology

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

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

Tissues and Fluids of Body.

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

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

Gastro Intestinal Tract.

Ingestion of food, mastication (Chewing)/ Digestion and Swallowing
Functions of stomach
Storage function, mixing of food

Secretions of GIT

Saliva, Salivary glands functions of
Saliva, Gastric Secretion, Functions of
Pancreatic Secretion, Bile Secretion and its function

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

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 proteins for energy, Vitamins and their metabolic role.

Endocrine Glands

Endocrine glands and their hormones

The pituitary hormones and their functions

The thyroid hormone, the adrenocortical hormones

Parathyroid hormones and their functions

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

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

Nervous System

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

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PAPER:- OPHTHALMALIC TECHNIQUES

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 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

- i. Sterilization
- ii. Instruments their usage and care
- iii. Method of Assistantship
- iv. Behavior in the operation theatre
- v. Maintenance of instruments in the O.T and OPD
- vi. Preoperative and postoperative care of the ophthalmic patients

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- vii. Hospital acquired infections and their prevention

CLINICAL OPHTHALMOLOGY

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

- a. Glaucoma-measurement of IOP (Tonometry)
- b. Ocular injuries
 - a. Burns
 - b. Mechanical injuries
 - c. Laceration of the eyelids
 - d. Foreign bodies
 - e. Injuries of the conjunctiva
 - f. Abrasions and superficial lesions of the cornea
 - g. Perforating injuries of the eyeball
 - h. Contusions of the eye ball
 - i. Orbital injuries

DISEASES

- a. Diseases of Lid
- b. Diseases of conjunctiva
- c. Diseases of cornea
- d. Diseases of uveal tract
- e. Diseases of Lens (cataract)
- f. 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

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LIST OF PRACTICALS

OCULAR SURGERY

- Preparation of Operation Theatre of common Ocular Surgery
 - CATRACT
 - CHALAZION
 - SYRINGING
 - DACRYOCYSTECTOMY
 - GLAUCOMA
 - EPILATION
 - STRABISMUS
- **OPTICS/REFRACTION**
PRACTICAL –I To diagnose common error of refraction & Management in
 - MYOPIA
 - HYPERMETROPIA
 - ASTIGMATISM
 - PRESBYOPIA
 - ANISOMETROPIA
 - EMETROPIA
 - COLORED VISION

PRACTICAL – II RETINOSCOPY

- INDICATION
- APPARATUS
- PROCEDURE
- PRECAUTION

PRACTICAL –III VISUAL ACUITY

- INDICATION
- APPARATUS
- PROCEDURE
- PRECAUTION

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OPTICS

1. To verify the laws of reflection
2. To verify the laws of refraction
3. To find the positing 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 option of an object from a lens, by adjusting the positional of a lens

SURGERY AND OPD

1. O.T. INSTRUMENTS

- i. Speculum
- ii. Eorueal Scissors
- iii. Needle Holders
- iv. Hooks
- v. Conjunctival Scissors
- vi. Cautery
- vii. Knife with blades
- viii. Iris Reponters
- ix. Stitches 10, 80, silk 40
- x. SIMCOR Canola
- xi. IOLs
- xii. Visco Elasties
- xiii. Muscles retractors
- xiv. Care of Microscopes & bulbs

b. OPD

- i. Measurement of Vision
- ii. Snellen's test charts for distant vision and for near vision
- iii. Color Vision Charts

c. GLAUCOMA TESTS

- i. Field of Vision
- ii. Schmitz Tonometry
- iii. Casual Staring

d. DRESSING AND BANDAGESA.

- i. How to put drops
- ii. How to apply eye bandage
- iii. How to care FBs in eye

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RECOMMENDED BOOKS

1. Book of Ophthalmology by Chattered
2. Parson's Diseases of the Eye

F.SC Ophthalmology Technology 2ND YEAR

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3.	Pak Study	According to BISE Peshawar	50	Nil
4.	Basic Medical Sciences Public Health & First Aid	Teacher Lecture Notes	75	25
5.	Applied Sciences Computer & Hospital Safety	Teacher Lecture Notes	50	25
6.	Ophthalmic Techniques –II	Teacher Lecture Notes	75	50

Grand Total= 450 + 100 = 550

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PAPER:- APPLIED SCIENCES (COMPUTER SCIENCES & PATIENT SAFETY)

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, minicomputer, 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 into 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, program, 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 program
16. Presentation program
17. Data base management system
18. Networking basics – brief of use, structure, LANs, Media, Hardware and software
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- five phases-need, Design, development implementation, maintenance
26. Building information system – five phases – need Design, development, implementation, maintenance.
27. Creating programs-definitions of program and approaches
28. Programming language and system development life cycle
29. Ergonomics health and privacy issues
30. Brief of computer crimes, Viruses. Theft and computer environment

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PAPER:- APPLIED SCIENCES (COMPUTER SCIENCES & PATIENT SAFETY)

Patient Safety

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

FIRE AND EXPLOSION IN HOSPITALS

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

SURGICAL DIATHERMY AND OTHER POSSIBLE HAZARDS IN HOSPITALS

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

RADIATION

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

INFECTION IN HOSPITALS

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

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PAPERS:- BASIC MEDICAL SCIENCES (PUBLIC HEALTH & FIRST AID)

Public Health

Introduction: To health field, definition of health, preventive, social, community and family medicine.

Health care organization in Pakistan.

- i. General introduction to federal, provincial, divisional and district level organizational structure.
- i. Role of Paramedics in hospitals

AIR

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

WATER

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

VENTILATION

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

WASTAGE

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

INFECTION AND DISINFECTING

Introduction-Terminology-Methods of disaffection
Sources of infection-routes of transmission i.e., air water and food

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.

FAMILY PLANNING

Need and objectives-general methods.

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PAPERS:- BASIC MEDICAL SCIENCES (PUBLIC HEALTH & FIRST AID)

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-volume shock (Hematologic) 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 new born
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 are
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. Phyla tic 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

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PAPER:- OPHTHALMALIC TECHNIQUES

ANATOMY OF THE HUMAN EYE

A brief description of the human eye including the study of the following

- 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, Tonometry, auto refractor and Slit lamp

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LIST OF PRACTICAL

OCULAR EMERGENCIES

PRACTICAL

PRACTICAL: Removal of Conjunctival Foreign Body

- Indication
- Apparatus
- Procedure
- Results
- Precautions

PRACTICAL –II First Aid Management of Ocular Emergencies

- Removal of corneal foreign body
- Penetrating injury of the Eye ball
- Laceration of the cornea
- Injuries of the eye lid
- Chemical Injuries of the eye
- Thermal Trauma
- Drug reaction
- Acute Congestive Glaucoma
- Retinal Detachment
- Acute Uveitis

The student will have to cover following points for each of the above and other eye emergencies / disease.

- Apparatus
- Procedure
- Results
- Precautions

Practical –III instillation of Eye Drops

- For Treatment
- For Anesthesia

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- 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 the 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
 - i. Indication
 - ii. Types
 - iii. Apparatus
 - iv. Procedure
 - v. Precautions
- Ophthalmoscopy
 - i. Indication
 - ii. Types
 - iii. Apparatus
 - iv. Procedure
 - v. Precautions
- Tonometry
 - i. Indication
 - ii. Types
 - iii. Apparatus
 - iv. Procedure
 - v. Precautions
- Biometry
 - i. Indication

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- ii. Types
- iii. Apparatus
- iv. Procedure
- v. Precautions
- Corneal
 - i. Indication
 - ii. Types
 - iii. Apparatus
 - iv. Procedure
 - v. Precautions
- Staining
 - vi. Indication
 - vii. Types
 - viii. Apparatus
 - ix. Procedure
 - x. Precautions
- Eversion of Upper Eyelid
- Fluorescein Angiography
 - i. Indication
 - ii. Types
 - iii. Apparatus
 - iv. Procedure
 - v. Precautions

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's injuries.
- c. Prevention of amblyopia in children.
- d. Prevention of ocular diseases.
- e. A brief introduction of LASER and its uses in Ophthalmology. Special care of children with:
 - i. Ophthalmic Disease
 - ii. Ophthalmic care in school children

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