SYLLABUS FOR THE POST OF REFRACTIONIST

➢ GENERAL HUMAN BIOLOGY & DISEASES

✓ HUMAN BIOLOGY & DISEASE (Marks 10)

a) **Infectious Diseases** : General account, causes and control, immunity and chemotherapy.

b) **Diseases of man**
(Definition of Disease, different type of pathogens such as bacteria, viruses and virus like organisms, fungl, helminths, protozoa), sources of Infections, Infection and contagious economic importance of diseases, methods of prevention and biology control.

c) **Introduction** : Micoroscopic structure of lissues and organs of a manual lissue-Connective lissues, epithelium, cartilage, bone, blood, muscular lissue and nervous lissue.

d) Basic knowledge of Systems.

e) **Organs :** Stomach, small intestine, liver pancereas lungs, spleen, kidney, skin, testis and ovary.

f) Functional anatomy and physiology of the digestive system, Respiratory System, Circulatory System (with reference to immunity) Nervous System with special reference to transmission of the nerve impulse, sense organ, functions of muscles, Reproductive System, Endocrine System.

g) Basic Pathology as applicable to above Systems.

✓ CELLBIOLOGY & GENETICS INTRODUCTION:

Cell theory, cell as a unit of life. Tools and techniques of cell studies, Microscopy (Use of Microscope and Calibration), elements of microscopic techniques histo and cytochemistry, Electron microscope.

Elementary Knowledge of principles of X-ray definition. Instruments and diffraction paltern.

Molecular building in cellular system simple to complex macromolecules, structure and properties, Biomembrance-Transport mechanism, cellular respiration cell organelles structure and their functions. Enzymes, Vitamins and Hormones their functions chemical and physical structure, mode of action. Role of regulation of cellular activities.

Nucleus, Chromosomes, DNA structure including events in replication and Transcription, genetic code, translation and protein synthesis and details of neiosis, gene interaction, linkage and crossing over, mutation, elaboration of Mendel's laws of inheritance, elementary concepts of quatitive inheritance human genetics, sex linked inheritance, genetics and society.

➢ ANATOMY & PHYSIOLOGY OF EYE (Marks 20)

✓ ANATOMY OF THE EYE

a. Muscles of Eye.
b. Conjuctiva, comea, sclera, iris.
c. Ciliary body, choroid and retina.
d. Lens, vitreous and optic nerve.
e. Circulation of the Eye.
f. Orbit its relations and vascular communication.
g. Lacrimal & lid glands.
h. Visual Pathway.
i. Cranial Nerves II, III
j. Cranial Nerves IV, V, VI & VII.
k. Pituitary Gland and Caverous Sinus.
l. Parasympathetic, sympathetic nerves in relation to eye.

✓ PHYSIOLOGY OF THE EYE

a. Eye lid, lacrimal gland and lid gland.
b. Functions of the eye ball and its parts.
c. Pupillary reflexes.
d. Convergence and accommodation (Pathway)
e. Convergence and accommodation (Theory & Mechanism)
f. Visual Pathways and fields.
g. Light sense, colour sense and night vision.
h. Form sense, visual acuity and testing.
i. Unilocular and binocular vision.
j. Eye movements (conjugate and Disconjugate) and laws governing them.
k. Visual cortex.
l. Vision

➢ PHYSICS, CHEMISTRY, PHARMACOLOGY & PATHOLOGY

(Marks 20)

➢ RELATED TO EYE

✓ PHYSICS

a. **Measurements :** Concept of length and time, Covnersation of some practical units. Equations of mechanicals quantity, area, volume, velocity, acceleration, momenutum, force moment, energy and work (Their definition).
b. **Wave Motion :** Simple Harmonic motion, waves and wave propagation, wave motion (including phase). Reflection, Dispersion, Polarization. Interference and differaction etc.
c. **Condensed State** : nature of liquids, surface tension, capillarity.
d. **Electricity :** Moving charges, electric current, thermal effect. Jourle's law, galvano meter, cyclotron (Basics) etc.
e. **Electromangetic Induction** : Lenz's law, Eddy currents, Faraday's laws of electro magnetic induction, elementary ideas of electro magnetic wages, rotating coil in a magnetic fields, alternating current, transformers, long distance transimission meters, phase relationship between voltage and current etc.

✓ CHEMISTRY

a. **Periodicity :** Periodic law and periodic table.

b. **Chemical handling and Molecular Shape :** Concept of orbital overlap in bond formation, hydridization and long electron pair repulsion concept or resonance bond energy and bond length, properties of convalent compounds in relation to electro negativity. Shape of the simple moelecules, co ordinate bond formation with a few examples. Lonic bounds & definition, factor inlluencing the formation of lonic bond, general properties of ionic compounds, metallic bond, an explanation for properties of metals. Hydrogen bonding etc.

c. **State of Matter :** Discuss in terms of order and kinetic energy, properties of gas, liquids& elementary introduction to solid state.

d. **Energetics, Energy Changes Chemical Reactions** : Exothermic and Endothemic reactions, solutions, fusions, vaporization and sublimation, Ness's Law, Calori values of food and fuels.

e. **Chemical Equilibrium** : Law of mass action and its application to chemical equilibrium, Le Chaterlier Braun principle, factors, Ionic equilibrium aquecus solution products, common lon effect. Modern concept of acid and acid base equilibrium, hydrolysis of salt, buffer solution etc.

f. **Electro-Chemistry (Basic) :** Electrolysis, Farady's and calculation based on them. Application of electrolysis to electroplating and electro chemical preparation, Electrolytic conduction.

g. **General Treatment of a block elements :** General trends of properties of the elements boron family, important minerals of boron, borax and orthoboric acid test, boron nitrates and boron, hydrides (only an elementary idea to show as an electron deficient molecule). Aluminium Its minerals, extraction, properties an uses. Some important compounds like alumina, aluminium and alums and alloys. (Especially boron, borox, aluminium group, including alums, carbon and nitrogen family).

h. **The Carbon Family :** General trends in properties, important mineral of tin and lead, various compounds, alloys of tin and lead.

i. **The Nitrogen Family** : General trends in properties of the family, important mine of phosphorus, ammonia, its manufacture, oxide and oxy-acids of nitrogen and phosphorus. Uses of metaphosphate, super phosphates and chemical fertilizers.

j. Organic chemistry as chemistry of carbon compounds hydrocarbons, simplest organic compounds types of hydrocarbons, homologour series.

   a. Physical properties to be based on nature of bonding. Size and nature of the carbon chain and the general non-plar character.
   b. Chemical Properties : Combustion and controlled oxidation : Free halogenations and cracking in alkanes, Catatylic hydrogenation and electro philic addition in alkanes and alkynes. Markwnikoff's rule.
   c. Some simple transformations in benzene and aliphatic compounds
   d. Sources of hydrocarbons : Petroleum and coal for treatment from industrialpoint of view.

k. Galvanic Cells and cell potential I, electrochemical series.

✓ PHARMACOLOGY.

1. Basic Phamacology, Pharmacy Etc.
2. Antiseptics.
3. Local anaesthetics, analgesics
4. Anti-glaucoms drugs.
5. Sedative and tranquilizers
6. Mydratics and Miotics.

7. Antipyretics
8. Sterolds
9. Chemotheapy agents including antibiotic.

✓ PATHOLOGY TELATED TO EYE

a. Common eye Diseases.
b. Diseases of Eye lids.
c. Diseases of Orbit.
d. Diseases of Adenexa.
e. Diseases of Cornea.
f. Diseases of conjunctiva
g. Diseases of Lens.
h. Injuries of the Eye.

➢ OPTICS INCLUDING MECHANICAL OPTICS (Marks 25)

✓ OPTICS

- Huygens construction (geometrical). Young's double slit experiments (idia of path difference). Loyd's Morror, colour of the films (qualitative), single slit, diffraction, applications of lesser beams, spectrometer, production of different types of spectraline, continuous and absorption.
  - **a.** Nomenciature of prisins and their uses.
  - **b.** Ophthalmic glass and physical for of lenses of ophthalmic lenses.
  - **c.** Transmission density and opacity of a refracting glass and glass coating
  - **d.** Cylindrical lenses, stum's coniod.
  - **e.** Lens combination.
  - **f.** Aberration of lenses.
  - **g.** Principle of fabricating various types of special lenses.
  - **h.** Ophthalmic plastic lens.
  - **i.** Refractive media of eye and principles of visual imagery.
  - **j.** Corneal system and lenticular system.
  - **k.** Reduced eye and images formation including gauss theorem.
  - **l.** Aberration of Eye.
  - **m.** Principles, mathematical deviation and utility of Punkinie images.
  - **n.** Pachometer.
  - **o.** Keralometer.
  - **p.** Accomodation and convergence.
  - **q.** Optical defects in genesis of refractive arrears (Presbyopia, Aphakia and principles of their treatment with lens).
  - **r.** Instruments concerning opthatmic glass testing.
  - **s.** Physiological basis of visual acuity and retinal images sizes.
  - **t.** Human eye and spectacles.
  - **u.** Effects of lens of the retinal image.
  - **v.** Field of view and magnification.
  - **w.** Refractive errors.
  - **x.** Retinoscopy & its principles.
  - **y.** Surface reflection.

✓ MECHANICAL OPTICS

a. Power of lens.
b. Transposition of spectable lenses, shapes and sizes.
c. Grinding Machines
d. Grinding Materials.
e. Tools and gauge and their testing.
f. Spherical lenses.
g. Cylindrical lenses.
h. Bifocals and Multifocals.
i. Ophthalmic peisms.
j. Prism effect.
k. Oblique cylinders.
l. Protective lenses.
m. Plastic lenses.
n. Special lenses-Miscellaneous lenses & appliances.
o. Speciality lenses:

➢ MAINTANCE OF EQUIPMENT & INSTRUMENTS, ROUTINE& SPECIAL EYE INVESTIGATIONS & RELATED SURGICAL PROCEDURES

(Marks 25)

✓ MAINTENANCE OF EQUIPMNETS & INSTRUMENTS

- Understanding of ophthalmic equipments.
- Optical equipments: Ophthalmoscope, slit lamps keratomcters Torches etc.
- Maintenance of Surgical Instruments.
- Diathermy machine.
- Microscope (laboratory) 7 eye bank equipments.
- Perimeter.
- Trial sets.
- Orthoptic equipments.

✓ ROUTINE OPTHALMIC INVESTIGATION

- Conjunctival Swab & smear taking for cytology & culture.
- Syringing and lacrimal function test.
- Tension taking.

- Colour vision.
- Visual fields.
- Various instruments, their principles.
- Dark adaptometry.
- Keratometery.
- Pachometery.
- Anaesthesiometry.
- PH. Testing.
- Othocalor.
- Refractionometer.
- Measurement of spectacle lense, power of focimeter.
- Fluorescein staining and techniques.

✓ SPECIAL OPTHALMIC INVESTIGATIONS

- E.R.G.
- E.C.G.
- Electro oculomyography.
- Ultrasonography.
- Tomography.
- Burrnan's Locater.
- Fluorescse in Angiography.
- Oculo- Nystagmography
- Ocular Photography anterior segment.
- Gonioscopy and 3 mirror C.L Examination.

✓ ORTHOPTICS, PLEOPTICS AND MUSCULAR IMBLANCE

a. Normal Binocular function.
b. Grades of binocular vision.
c. Fusion and stabismus stereopis (SMP).
d. Etiology of strabismus.
    - Surgery.
    - Motor.
    - Central.

- **Methods of examination of strabismus.**
    - History.
    - Visual acuity.
    - Cover test.
- **Ocular Movement and their testing.**
    - Measurement of angle of squint
    - Testing of Binocular functions
    - Reterophoira
        - Classification

- Clinical picture
- Investigations

- **Esophoria**
  - Classification, Investigations.
  - Treatment
- **Pheria (Cent.)**
  - Hyperphoria
  - Cyclophoria & Hyphoria
- **Abnormalities of Monocular Vision**
  - Diploia
  - Confussion Supression
- **Abnormal Retinal Correspondance**
  - Definition
  - Aetiology
  - Classification

Methods of detection of A.R.C. with their relatives importance of A.R.C. (Conti.)

- Prognosis
- Classification
- Investigations
- A.C./A. Ration
- Its importance
- Methods of testing

Concomitant Squint (accommodative)

- **Aetiopathogenesis**
  - Classification
  - Special investigations
- **Treatemt of Accommodative Squint**
  - Optical
  - Orthoptics
  - Miotics
    - Surgery
- **Subject**
  - Non – Accomodative Squint
  - Classification
  - Investigations
  - Treatment
- **Divergent Squint**
  - Classification
  - Investigations
- **Vertical Squint**
  - Aetiology
  - Classification
  - Investigations

- **Primary Vertical**
- **Secondary Vertical**
  a. Differential Diagnosis of Primary and secondary
- **Alternating Circumducdtion**
    - Aetiology
    - Classification
    - Clinical Picture
    - Investigation & Management
- **Torsional Squints**
    - Cyelotopia
    - Aetiology
    - Classification
    - Clinical Picture & Management
- **Suppression**
    - Defection& treatment
- **Amolyopia**
    - Definition
    - Aetilogy
    - Development
    - Classification
    - Detection
    - Management with occasional therapy after images
    - Definition
    - Description
    - Usage of after images in the treatement of Amoblyopia and pleoptic therapy
    - Haldinger brushes
    - Bangerter methos of pleoptic therapy
    - Indication of Orthoptic and surgical treatment
    - Latent strabismus
    - Manifest Stabisumus
    - Post-operative Othoptic Management.

✓ INTRODUCTION TO TECHNIQUES AND PREPARATION OF THE PATIENT

- Asepris-How to achieve?
- Anaesthetic agents and where indicated.
- Pre-operative Instructions.
- Cauterisation of Ulcers.
- Spilation and Electrolysis.
- Bandging of Eye.
- Syringing.
- Scraping.
- Taking samples for conjunctival and culture examinations.

- **NUTRITION, INDUSTRIAL INCLUDING HILOLOGY, STATISTICS & COMMUNITY WELFAARE (Marks 20)**
  - ✓ **Indusstrial Hazards & Their Protection Hilology, Statistics & Nutrition**
    a. Concept, Importance, classification food, dietry requirements (in context with eye,
) balanced Dieet, Community Nutrition, Nutritional education : definition, scope, principles ect.
    b. Nutrition and Eye Diseases.
    c. Introduction, Concurrence, methods of cultivation of important crop plants and related diseases.

  - ✓ STATISTICS AND CLAULUS

a. Statistics & Probability

- Population and sample
- Measures of central lendency and dispersion.
- Point and interval estimation (of mean only)
- Scatter diagrams and a Pearson Correlation co-efficient) probality:
- Random experiments and sample space. Events.
- Probility on a sample.
- Conditional probility, multiplication theorem.
- Independent events.
- Random variables (disscsrete), Binomial and poisson probility distr
- Expected value (Mean) and variance. Calculations for probability distribution.
- Normal distribution.

Fundamental principles and basic knowledge.

✓ VISIONAIDS, CONTACAT LENS & PROTECTIVE GALSSES

- Contact lens basic concepts.
- Lense designing.
- Manufacturing principles and low vision aid.
- Causes of visual impairment and blindness.
- Classification of low vision aids and special optical features of groups and child mode action.
- Introduction to visual prosthesis.
- Visual requirement in industries.
- lluminations.
- Prevention of industrial injury and special services to aid this.
- First Aid to eye injury.

- **Entrepreneurship**: Introduction to entrepreneurship meaning, importance and persons qualities needed, scope, employment opportunities, Introduction to small business, production Marketing, managerial and financial, selection of business and preparation of Project Report. Financing Agencies, Financial facilities how and where to get procedural details in starting a new industry, investment, decision,

market study, production, planning and scheduling budgeting, man power planning.

✓ COMMUNITY WELFARE

- Eye Screening Programmes, (with special emphasis on National Blindness Control Programme), School Clinics and Surveys.
- Functioning of Mobile Eye Health Units including eye camps and practical participation in the same.
- Determination of refractive errors and prescription of glasses.
- Blind and its problems and rehabilitation for the blind.
- Health Education in the field of eye care.
- Medical Secretarial Assistance.
- Appointments.
- Drafting and correspondence.
- Records Maintenance
- Coping.