निजामती कर्मचारी अस्पताल

प्राविधिक सेवा, अप्थाल्मोलोजी समूह, अप्थाल्मोलोजी उपसमूह, अप्टोमेट्रिष्ट पद, छैठौं तहको खुला तथा आन्तरिक प्रतियोगितात्मक परीक्षाको पाठ्यक्रम

यस पाठ्यक्रम योजनालाई दुई चरणमा विभाजन गरिएको छ :

प्रथम चरण :– लिखित परीक्षा (Written Examination) पूर्णाङ्क :– २००

द्वितीय चरण :– अन्तर्वार्ता (Interview) पूर्णाङ्क :– ३०

प्रथम चरण (First Phase) : **परीक्षा योजना (Examination Scheme)**

पत्र	विषय	पूर्णाङ्क	उतीर्णाङ्क	परीक्षा प्रणाली		प्रश्नसंख्या X अङ्क	समय
प्रथम	Technical Subject	१००	४०	वस्तुगत	बहुवैकल्पिक प्रश्न	५० प्रश्न x २ अङ्क	४५ मिनेट
द्वितीय		१००	४०	विषयगत		१० प्रश्न X १० अङ्क	३ घण्टा

द्वितीय चरण (Second Phase)

विषय	पूर्णाङ्क	परीक्षा प्रणाली
अन्तर्वार्ता	३०	मौखिक

द्रष्टव्य :

१. यो परीक्षा योजनालाई प्रथम चरण (लिखित परीक्षा) र द्वितीय चरण (अन्तर्वार्ता) गरी दुई चरणमा विभाजन गरिएको छ ।

२. लिखित परीक्षाको माध्यम भाषा नेपाली वा अंग्रेजी अथवा नेपाली र अंग्रेजी दुवै हुनेछ ।

३. प्रथम र द्वितीय पत्रको पत्रको विषयवस्तु एउटै हुनेछ ।

४. प्रथम र द्वितीय पत्रको लिखित परीक्षा छुट्टाछुट्टै हुनेछ ।

५. परीक्षामा सोधिने प्रश्नसंख्या, अङ्क र अङ्कभार यथासम्भव सम्बन्धित पत्र/विषयमा तोकिए अनुसार हुनेछ ।

६. वस्तुगत बहुवैकल्पिक (Multiple Choice) प्रश्नहरुको गलत उत्तर दिएमा प्रत्येक गलत उत्तर बापत २० प्रतिशत अङ्क कट्टा गरिनेछ । तर उत्तर नदिएमा त्यस बापत अङ्क दिइने छैन र अङ्क कट्टा पनि गरिने छैन ।

७. वस्तुगत बहुवैकल्पिक हुने परीक्षामा परीक्षार्थीले उत्तर लेख्दा अंग्रेजी ठूलो अक्षर (Capital letter) A, B, C, D मा लेख्नुपर्नेछ । सानो अक्षर(Small letter) a, b, c, d लेखेको वा अन्य कुनै सङ्केत गरेको भए सबै उत्तरपुस्तिका रद्द हुनेछ ।

८. बहुवैकल्पिक प्रश्नहरु हुने परीक्षामा कुनै प्रकारको क्याल्कुलेटर (Calculator) प्रयोग गर्न पाइने छैन ।

९. विषयगत प्रश्नका लागि तोकिएका १० अङ्कका प्रश्नहरुको हकमा १० अङ्कको एउटा लामो प्रश्न वा एउटै प्रश्नका दुई वा दुई भन्दा बढी भाग (Two or more parts of a single question) वा एउटा प्रश्न अन्तर्गत दुई वा बढी टिप्पणीहरु (Short notes) सोध्न सकिने छ ।

१०. विषयगत प्रश्नमा प्रत्येक पत्र/विषयका प्रत्येक खण्डका लागि छुट्टाछुट्टै उत्तरपुस्तिकाहरु हुनेछन् । परिक्षार्थीले प्रत्येक खण्डका प्रश्नहरुको उत्तर सोही खण्डका उत्तरपुस्तिकामा लेख्नुपर्नेछ ।

११. यस पाठ्यक्रम योजना अन्तर्गतका पत्र/विषयका विषयवस्तुमा जेसुकै लेखिएको भए तापनि पाठ्यक्रममा परेका कानून, ऐन, नियम तथा नीतिहरु परीक्षाको मिति भन्दा ३ महिना अगाडि (संशोधन भएका वा संशोधन भई हटाईएका वा थप गरी संशोधन भई) कायम रहेकालाई यस पाठ्क्रममा परेको सम्झनु पर्दछ ।

११. प्रथम चरणको परीक्षाबाट छनौट भएका उम्मेदवारहरुलाई मात्र द्वितीय चरणको परीक्षामा सम्मिलित गराइनेछ ।

१२. पाठ्यक्रम लागू मिति :– आ.व. २०७९/०८०

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Paper I and II: Technical subject

Section (A): 50 % Marks

1. **Basic Human Anatomy and Physiology**

Basic anatomy and physiology the following system:

- 1.1 Musculoskeletal system
- 1.2 GI system
- 1.3 Digestive system
- 1.4 Respiratory system
- 1.5 Nervous system
- 1.6 Cardiovascular system
- 1.7 Endocrine System
- 1.8 Reproductive system

2. **Ocular Anatomy and Physiology**

- 2.1 Embryology of eye (ocular)
- 2.2 Anatomy, physiology, nerve supply and vascular supply pertaining to :
  - 2.2.1 Formation of optic vesicle & optic stalk, formation of lens vesicle, formation of optic cup, changes in associated mesoderm, development of various structure of eye ball – retina, optic nerve, crystalline lens, cornea, sclera, choroid, cilliary body, iris, viterous. Development of accessory structures of eyeball – eyelids, lacrimal apparatus, extra-ocular muscles, orbit. Milestones in the development of the eye.
  - 2.2.2 Orbit: Bony orbit - Size, shape & relations, walls of the orbit, Base of the orbit, Apex of orbit. Orbital fascia - Fascial bulbi, Fascial sheaths of extraocular muscles, intermuscular septa. Spaces of orbit - Orbit fat & reticular tissue - Apertures at the base of orbit- Contents of the orbit – Orbital nerve - oculomotor , Trochler, Abducent, Trigeminal, facial nerves - their functional components, course & distribution, clinically applied aspects.
  - 2.2.3 Cornea - Layers & peculiarities, Blood supply & nerve supply of cornea. Structure of cornea. Corneal transparency & hydration, Regulation of corneal transparency & hydration. Corneal vascularization. Maurice theory & Goldman's theory
  - 2.2.4 Lens & Zonules - Structure of lens, capsule, Ant. Epithelium, lens fibers (structured & zonal arrangement); Ciliary zonules - structure gross appearance; Arrangement of zonules fibers. Lens: Introduction, function of lens. Lens transparency. Lens culture. Changes in ageing lens.
  - 2.2.5 Uveal Tract & its vascular supply - Iris macroscopic & microscopic appearance. ciliary body – Macroscopic structure. Chloride - Macroscopic structure. Blood supply to uveal structure- short & Long Posterior artery & Anterior Artery. Venous drainage. Uveal tissue: Uveal meshwork. Uveo-scleral drainage. Schlemm's canal switch.
  - 2.2.6 Vitreous - main masses of vitreous. Base of the vitreous. Hyaloidean vitreous. Vitreous cells. Aqueous humour: Formation of Aqueous humour. Drainage & circulation of Aqueous Humor. Rates of production & flow. Functions of Aqueous humour. Vitreous Humour: Composition & distribution of vitreous humour, Physiology & function of vitreous humour, Optical role of vitreous humour.

2.2.7 Sclera – Anterior, posterior & middle apertures. Episclera. Sclera proper. Lamina fusca. Blood supply of the sclera. Nerve suply of the sclera.

2.2.8 Anterior chamber and its angle- angle of the anterior chamber. Trabecular meshwork. Canal of Schlemm. Schwalbe's line. Drainage of aqueous humor.

2.2.9 Retina & its vascular supply - Retinal structure-layers of retina. Rod & Cones. Organization and Function of retina. Microscopic structure of fovea centralize, Blood retinal barrier. Anatomy of optic nerve, optic chaisma optic tracts, Lateral Geneculate body, optic radicalism - visual cortex, Arrangement of nerve fibers. Physiology of optic nerve. Papilledema of optic nerve. Optic atrophy. Blood supply of visual pathways. Ocular Circulation: Vascular structure of the eye – ocular circulation, blood-ocular barrier (Blood-retinal, blood Vitreous & blood aqueous barrier). Regulation of ocular circulation. Geneculate cortex: Structure of geneculate cortex. Electrophysiologyc. Projection – retinal projection. Visual cortex & function of visual cortex.

2.3 Protective Mechanism of the eye – Blinking – muscles of lead closer & lid opening, Muller's muscle, blinking reflexes. Lacrimation – Lacrimal glands, Pre corneal tear film, Chemistry of lachrymal secretion tear film, Tear film dynamics (secretion of tear, formation of tear, retention & redistribution of tear, displacement phenomena, evaporation from tear film, drying & breakup of tear film, dynamic events during blinking, elimination of tear.)

2.4 The ocular motor system – Extra ocular muscles their function & nerve supply. Mechanics of actions of extra ocular muscles -cross sectional area of muscle, length of muscle. Arc of contact, muscle plane, Muscle axis of rotation. Physiology of ocular movement – Basic Kinematics (position of gaze, Fick's axes). Ocular Movement (monocular and Binocular). Supra nuclear control of eye movements. Ocular movements - Monocular Movements (Adduction, Abduction, supraduction, Infraduction, Incycloduction, excycloduction) and Binocular Movements –VERSIONS - (saccadic & pursuit movement, position maintenance movements, stabilization movements & their characteristics). VERGENCES – (Convergence,divergence, vertical vengeance), Intraocular pressure – Features of normal IOP, Factors influencing the IOP,Control of IOP,Measurement of IOP.

2.5 The pupillary & ciliary muscle - Anatomy of sphincter & Dilator muscle. Ciliary muscle – Anatomy, types.

2.6 The nerve supply of the eye ball.

2.7 The lachrymal appears - Lachrymal gland, Palpebral part, Duets of lachrymal gland, structure of the lachrymal gland, Blood supply & nerve supply of the lachrymal gland, lachrymal passages.

2.8 Anatomy of the Ocular Adnexa & glands; Structures of the lids; Skin, Subcutaneous Areolar Layer, Layer of Staiated muscle, Submuscular Areolar Tissue, Fibrous Layer, Conjunctiva.Glands of the Lids- Meibomaian Glands, Glands of Zela and Glands of Moll. Blood Supply of the Lids, Lymphatic Drainage of the Lids, Nerve Supply of the Lids.

2.9 Conjunctiva - Palpebral Conjunctiva, Bulbar Conjunctiva, Conjunctival Fornix, Microscopic Structure of the conjunctiva- Epithelium, Substantia Propria. Conjunctival Glands→ Krause's Glands, Wofring's Glands,

2.10 Henley's Glands, Manz Glands. Blood Supply of the Conjunctiva, Nerve Supply of the Conjunctiva, Caruncle, Plica Semilunaris.

2.11 Pupil – Normal pupil, Physiological changes in pupil size – Isocoria, Pupillary unrest, Hippies. Pupillary reflex – Light reflex, Near reflex, Darkness reflex , Psycho sensory reflex, Lid closure reflex

3. **Visual Science**

3.1 Measurement of visual threshold. Principle and components of visual functions such as visual acuity, contrast sensitivity, light and dark adaptation, spatial vision, temporal vision, color vision. Eye movements- Entopic phenomenon, Circadian cycles in vision, Functional retinal physiology, Parallel processing

3.2 Striated cortical and extra-striated cortical functions related to processing of visual information, motion detection, signal detection, spatial and temporal perception, binocular space perception

3.3 Organization of all these receptive field structures and neural channeling.

3.4 Basic concept & metabolism of carbohydrate, protein & fat. Process of glycolysis, glycogenolysis, TCA cycle significance.

3.5 Vitamins - source, daily requirement, Metabolism, Functions, deficiency.

3.6 Basic outline of hormone action

3.7 Physical & Chemical Characteristics of hormone. Types of hormone. General mechanism of hormone action via Massenger system.

3.8 Cornea – Biochemical composition of cornea. Sources of Nutrients-Oxygen, Glucose, Amino acid. Metabolic pathway in cornea – Glycolysis, HMP shunt.

3.9 Tear film- Functions of Tear film. Different layers of Tear film. Chemical composition of tears. Tear film abnormalities. Tests for film Adequacy.

3.10 Lens – Biochemical composition of lens. Lens protein – their types & characteristics. Lens

3.11 Metabolism - Carbohydrate metabolism, protein metabolism. Cataract – Due to biochemical defects of lens. Antioxidant mechanism in the lens.

3.12 Biochemistry of the visual process - Photopigments – Rhodopsin & Iodopsin. Chemical nature of Rhodopsin. Visual cycle (Bleaching of Rhodopsin, Transducin cycle, Role of Phosphodiestareses).

3.13 Accommodation – Far point, near point, range & amplitude of Accommodation. Mechanism of accommodation – Increased tension theory, Relaxation theory, Role of lens capsule, Gullstrand mechanical model of accommodation. Stimulus for accommodation. Ocular changes in accommodation. Changes in accommodation with arc (Presbyopia). Nervous mechanism for accommodation

3.14 Color vision- Physiological, Photochemical & neurological basis of color vision. Electrophysiology of color vision. Granit's modulator and dominator theory, Purkinje phenomenon. Young-Helmholtz theory. Types of color defects. Color blindness. Neural analysis

3.15 Visual perception – Higher integrative activity, Binocular perception, stereoscopic depth perception. Neurophysiology of perception – Higher visual pathways (primary visual Pathway to cerebral center, Lateral Geniculate body, non-geniculate targets for retinofugal input, visual center). Neurophysiology of perception – Spatial analysis, Double pathway to higher visual centers.

3.16 Physiology of vision: Visual acuity – visual angle, components of Visual acuity, measurement of visual acuity. Contrast Sensitivity – Types, Neural Mechanism, Measurement of contrast sensitivity (Arden gratings, Cambridge low contest

gratings, Pelli – Robson chart). Light & Dark adaptation – Dark adaptation curve, Mechanism of dark adaptation, Factors influencing dark adaptation, Time course of light adaptation, Mechanism of light adaptation, Rod vs. cone light adaptation. Parkinje shift of spectral sensitivity. Binocular vision – Grades of binocular vision (simultaneous, fusion & stereopsis), Advantages of binocular vision, visual direction & horopter, Binocular fusion, Dichoptic stimulation , Depth perception, Integration of motor & sensory system.

4. **Physiologic and Geometric Optics**

4.1 Physical optics includes properties of light such as Propagation, Reflection, Refraction, Interference, Diffraction, Polarization, Absorption and Scattering

4.2 LASER and Photometry along with its application in eye.

4.3 Geometrical Optics: Schematic and reduced eyes and their properties. Optical constants of the eye and their measurement. Purkinje images. Corneal curvature and thickness. Keratometry and pachometry. Indices of aqueous and vitreous.

4.4 Optical Defects of the Eye- Shape of Cornea, Shape & RI of the lens, Optical axis, Visual axis, Fixation axis, Aberration of the Optical system of eye, Depth of focus, Diffraction & resolving power.

4.5 Emmetropia and ametropia, Axial versus spherical ametropia, Myopia Hypermetropia (Hyperopial) Astigmatism.

4.6 Correction of ametropia

4.7 Correction of myopia- spectacle refraction (F) – ocular refraction (K) – Relationship between F and K. correction of hypermetropia- the effect of vertex distance change. Correction of ametropia with Thick lenses.

4.8 Ammetropia in the actual human eye. The growth of the human eye in emmetropia. Spherical ametropia in adult eye. Genetic aspects of refractive error. Progressive myopia. Juvenile stress myopia.

4.9 Accommodation - possible mechanism of accommodation- Schiener disc experiment- theories of accommodation- modern theory- changes in the lens during accommodation- the amplitude of accommodation- the measurement of the amplitude n of accommodation- depth of field, luminance and blur tolerance- amplitude of accommodation versus age.

4.10 Presbiopia-near vision addition- estimate of addition-unequal near vision addition- effect of changing the spectacle distance – hypermetropia and accommodation.

4.11 Aphakia. Reflective error in aphakia. The retinal image size in aphakia. Correction of aphkia by a contact lens. Use of an intracocular implant. Power of the implant and retinal image size. Clinical aspects of aphakia.

4.12 Astigmatism. - Oblique astigmatism. Astigmatism in the reduced eye. The retinal images of point and extended objects. Classification of astigmatism. Correction of astigmatism by sphero- cylindrical, toric and contact lenses.

4.13 Retinoscopy – principle and use. Clinical recording of standard of vision-visual acuity.

4.14 Subjective refractive methods. Problem of review of objective refractive methods Cross- cylindrical method of detecting astigmatism

4.15 Eye as an imaging instrument. Schematic eyes. Diffraction and the eye. Image formation in wave optics.

4.16 Aberrations of the lens and cornea. Chromatic aberration of the eye. Optical performance of the eye. Total performance of the eye. Variation of visual performance with focus. Contrast sensivity of the eye.

Section (B): 50 % Marks

5. **Optical & Ophthalmic Instrumentation & Procedure**

5.1 Tonometer – Principles, types, clinical importance, application
5.2 Pachometer – Principles, types, clinical importance
5.3 Devices for color vision testing – CS testing / Glare testing.
5.4 Ultrasonography – Principles and application.
5.5 F.F.A – Principles and demonstration of film.
5.6 PAM – Principles and importance.
5.7 Perimeter – Basics of perimetry – Humphray instruments, Automated perimetry – basics, types, interpretation of normal Glaucoma Field of Definition.
5.8 LASER – Introduction – Different types of LASER - LASER safety, Ophthalmic LASER application
5.9 Specular & Confocal Microscopy
5.10 Focimeter or Lensometer.
5.11 Retinoscope.
5.12 Keratometer.
5.13 Binoculars, telescopes and projectors.
5.14 Simple and Compound Microscopes
5.15 Spectrometer.
5.16 Autorefractometer- subjective and objective types
5.17 Opthalmoscopes- direct and indirect types.
5.18 Refractometers- Auto refractors, Dioptron
5.19 Slit lamp Biomicroscope
5.20 Standard Test Charts
5.21 Trial case lenses-best forms.
5.22 Trial frame design.
5.23 Cross cylinder.
5.24 Orthoptic Instruments : Prism Bar, Synoptophore, Maddox Wing, Maddox Rod, Red Green Goggles, Hess Screen, Risley Prisms, RAF Gauge, Cover test, Hirschberg test, Krimsky test, Diplopia charting, Visuoscopy, Accommodative flipper
5.25 Electrodiagnostic tests – ERG, EOG, VER
5.26 BINOCULAR VISION TEST: Test for simultaneous macular perception, test for fusion, test for stereopsis-synoptophore or stereoscope test, vectograph test, titmus stereo test,randomdot sterogram test,simple motor task test based on stereopsis.

6. **General Pharmacology**

6.1 Nature & Sources of drug. Routes of drug administration (general & Ocular). Drug excretion & toxicity.
6.2 Pharmacokinetics of drugs - site of drug action, structure activity relationship. Drug receptor. Mechanism of action of a drug. Dose response relationship. Adverse drugs reactions (ADR), Manifestations of ADR. Factors influencing drug metabolism & drug action. Classification of drugs. Preparation and packaging of

ophthalmic drugs. Drug action and effectiveness. Ocular penetration. Topical anesthetics

6.3 Ophthalmic Drugs – antibiotics, corticosteroids, anesthetics, viscoelastics agents. Antiglaucomic drugs.

7. **Ophthalmic Lens and Dispensing optics**

7.1 Lens optics, Lens design material

7.2 Ophthalmic lens: Characteristics of lenses. Power of lenses. Aberration of lens. Prism prescription. Prism effects in a lens. Neutralization.

7.3 Spectacle lenses: Characteristics of lens materials.

7.4 Measurement of various lens parameters and powers, Ophthalmic prisms, Lens power transposition and verifications, Various tinted and protective lenses, Latest ophthalmic lens and designs

7.5 Selection of lens and frames, Face and frame measurement, Spectacle and frame mounting, Spectacle fittings and principles, edging and frame adjustment, Special dispensing for different vocation.

7.6 Various anatomical and physiological aspects related to contact lens fittings

7.7 Ocular Prosthesis materials, design, manufacturing handling and fitting and care

7.8 Contact lens history & development. Benefits of contact lens over spectacle. Manufacturing methods-spin cast, Lethe cut, Cast modeling.

7.9 Slit lamp Examination technique

7.10 Corncal topography- Keratometry & Extended Keratometry

7.11 Contact lens optics - Contact lens & spectacle lens. Back vertex calculation. Contact lens & Tear lens system. Classification of contact lens & its material (soft & RGP); Material property. Contact lens terminology. RGP & soft lens design. FDA classification of contact lens material. Patient selection & prescreening. Indications & contra indications of contact lens. Soft spherical contact lens fitting & Assesment. Soft contact lens case & maintenance. Spherical RGP contact lens fitting & assessment. RGP contact lens care & maintenance.

7.12 Lens types: Single vision lens. Bi-focal lenses. Tri-focal lenses. Vocational & occupational multifocal progressive lenses. Opthalmic lens coating

7.13 Absorptive lenses: Classification of lens tints. Chemical that produces color & assist in absorptive characteristics of glass lenses. Effect in prescription on lens color. Availability of tinted lenses.

7.14 Impact resistant lenses: Types of impact resistant lenses.

7.15 Lens for special uses: Fresnel lenses. Thinlite lenses. Lenses for the Aphakic patient. Aspheric lenses.

7.16 Lens surfacing & quality. Principles of lens surface generation. Glass assessment. Faults in lens materials & lens surface. Inspection of lens quality.

7.17 Basics of dispensing: Spectacle frame, Frame types, Frame measurements, Segment specification, Frame Selection, Lens Selection, Facial Measurement, Measuring heights

7.18 Eye protection: Industrial eye protection, Sport, Standards covering eye protection, Lens materials & impact resistance. Frame & eye protection.

8. **Ocular Diseases**

8.1 The sign and symptoms, assessment and management of following ocular diseases : Unilateral or bilateral red eye, Gradual loss of vision, Sudden loss of vision, Swelling and pain in and around the eye, Dry eye and Ocular surface

disorder, Night blindness, Leukocoria, Neuroophthalmic conditions, Abnormal pupillary reactions, Congenital disorders, Degenerative disorders, Dystrophies, Optometric management of headache, Phakomatosis and tumours.

8.2 Disease of the Lids – Congenital Deformities of the Lids. Oedema of the Lids. Inflammatory Conditions of the Lids. Deformities of the Lid Margins. Deranged Movement of the Eyelids.

8.3 Neoplasm's of the Lids. Injuries of the Lids.

8.4 Diseases of the Lachrymal Apparatus -.Dry Eye. Disease of the Lachrymal Gland. Disease of the Lachrymal Passages. Operations for Chronic Dacryocystitis.

8.5 Disease of the Conjunctiva- Subconjunctival Haemorrhage Infective Conjunctivitis. Follicular Conjunctivitis. Granulomatous Conjunctivitis. Allergic Conjunctivitis. Conjunctivitis Associated with Skin conditions. Degenerative conditions of the Conjunctiva. Vitamin- A Deficiency. Cysts and Tumours of the Conjunctiva. Conjunctival Pigmentation. Injuries of the Conjunctiva.

8.6 Disease of the Cornea – Congenital Anomalies. Inflammation of the Cornea (Keratitis). Superficial Keratitis. Deep Keratitis. Vascularisation of Cornea. Opacities of the Cornea. Keratoplasty. Corneal Degenerations. Corneal Dystrophy's. Corneal Pigmentation. Corneal Injuries. Refractive Corneal Surgery. Corneal Ulcer (Bacterial , Viral , Fungal)

8.7 Disease of the Sclera- Episcleritis. Scleritis. Staphyloma of the Sclera. Blue Sclerotic Scleromalacia Performs. Nanophthalmos. Injuries of the Sclera.

8.8 Disease of the Iris.-. Congenital Anomalies. Inflammations (Anterior Uveitis). Specific Types of Iriodocyclitis. Degenerations of the Iris. Cysts and Tumours of the Iris. Injuries of the Iris.

8.9 Disease of the Celery Body- Inflammations of the Celery Body. Purulent Iriodocyclitis (Panophthalmitis). Evisceration. Sympathetic Opthalmia. Vogt-Koyanagi – Harada Syndrome.

8.10 Tumours of the Celery body. Injuries of the Celery body.

8.11 Glaucoma- .Formation of Aqueous Humor. Drainage of Aqueous. Intraocular Pressure (IOP)

8.12 Ocular Rigidity.

8.13 Tonography. Developmental Glaucoma (Buphthalmos). Primary Narrow Angle Glaucoma. Primary Open Angle Glaucoma. Normotensive Glaucoma. Ocular Hypertension. Secondary Glaucoma. Surgical Procedures for Glaucoma, YOGPI, trabeculectomy. Laser Procedure in Glaucoma.

8.14 Artificial Drainage Devices in Glaucoma Surgery.

8.15 Disease of the Lens - Congenital Malformations. Cataract. Congenital and Developmental Cataract. Senile Cataract. Traumatic Cataract. Complicated Cataract. Secondary Cataract. After Cataract. Dislocation of the Lens. Surgical Procedures for Removal of the Lens.

8.16 Phacoemulsification (ICCE, ECCE, IOL). Small Incision Cataract Surgery. Intra-ocular Lens Implantation.

8.17 Diseases of the Vitreous Humor- Congenital Anomalies. Vitreous Opacities. Hereditary Vitreo – Retinal Degeneration's. Vitreous Haemorrhage. Detachment of Vitreous Humor. Vitreous Surgery.

8.18 Methods of clinically assessing the posterior segment (direct & indirect opthalmoscopy)

8.19 Disease of the Retina- Congenital & Dev. Defects. Inflammation of the Retina (Retinitis). Retinal Vasculitis. Oedema of the Retina. Haemorrhage of the Retina.

Vascular Occlusion. Retinal Arteriosclerosis. Retinopathies. Retinal Telangiectasis. Degeneration's of the Retina. Detachment of the Retina. Surgical Procedures for Retinal Detachment. Tumours of the Retina. Phakomatoses. Injuries of the Retina.

8.20 Disease of the Optic Nerve - Congenital Anomalies. Papilloedema. Inflammation of the Optic Nerve (Optic-Neuritis). Ischaemic Optic Neuropathy. Optic Atrophy. Tumours of the Optic Nerve. Injuries of the Optic Nerve.

8.21 Symptomatic Disturbances of Visual Function – Visual Field Defects. Amblyopia. Amaurosis. Nigh Blindness. Day Blindness. Defects in Color Vision. Congenital Word Blindness. Malingering.

8.22 Neuro – eye disease: Evaluation of optic nerve disease. Clinical features of optic nerve dysfunction. Optic disc changes. Optic atrophy. Special investigation. Classification of optic neuritis. Optic neuritis and demyelination. Systemic features of multiple sclerosis, Special investigation. Parainfectious optic neuritis. Infectious optic neuritis.

8.23 Non-arteritic anterior ischaemic optic neuropathy. Arteritic anterior ischaemic optic neuropathy

8.24 Clinical features of giant cell arteritis. Special investigation. Arteritic anterior ischaemic optic neuropathy.

8.25 Leber hereditary optic neuropathy

8.26 Hereditary optic atrophies

8.27 Kjer syndrome. Behr syndrome. Wolfram syndrome.

8.28 Alcohol-tobacco amblyopia

9. **Clinical Ophthalmology**

9.1 Arterial Hypertension: Pathophysiology, classification, clinical examination, diagnosis, complications, management. Hypertension and the eye.

9.2 Diabetes mellitus: Pathophysiology, classification, clinical features, diagnosis, complications, management. Diabetes mellitus and the eye.

9.3 Acquired Heart Disease: Embolism - Rheumatic heart disease, Subacute bacterial endocarditis. Heart disease & the eye.

9.4 Malignancy: Definitions, nomenclature, characteristics of benign & malignant neoplasms. Grading and staging of cancer, diagnosis, principles of treatment. Neoplasia and the eye.

9.5 Connective Tissue Disease- Anatomy and pathophysiology: Arthritis. Eye and connective tissue disease.

9.6 Thyroid Disease: Anatomy and physiology of the thyroid gland. Classification of thyroid disease. Diagnosis, complications, clinical features, management of thyroid disease involving eye.

9.7 Tuberculosis: Etiology, pathology, clinical features, pulmonary TB, diagnosis, complications, treatment of tuberculosis involving the eye.

9.8 Tropical Disease and the Eye: Leprosy, Syphilis, Malaria.

9.9 Vitamin deficiency and the eye

9.10 Neurological disease and the eye: Classification of neurological diseases. Demyelinating diseases, Visual pathway lesions, Papiloedema.

9.11 Genetic disorders and the eye.

9.12 Phacomatoses & the eye.

9.13 Parasitic and Protozoal infestations of eye

9.14 Effects of High altitude on eye

9.15 Ocular emergencies – Foreign body, Eye Pain, Watering, Injuries-perforating, non-perforating & chemical

10. **Low Vision and visual rehabilitation**
    - 10.1 Definition, disorders causing low vision and visual impairment
    - 10.2 Examination of low vision patients
    - 10.3 Assessment techniques
    - 10.4 Low vision magnification systems
    - 10.5 Devices, prescribing guidelines Optical and non-optical aids
    - 10.6 Psychological, behavioral and social counseling
    - 10.7 Visual rehabilitation and agencies working for blind and visual impairments.

11. **Pediatric Optometry and Binocular Vision**
    - 11.1 Visual Development, emmetropization and maturation of vision.
    - 11.2 Principles of eye movement, disorders, assessments and managements.
    - 11.3 Principles of muscle actions, field of vision and fixation.
    - 11.4 Principles of binocular single vision, various grades of binocular vision.
    - 11.5 Motor and sensory adaptation to various oculo-motor disorders, non-strabismic disorders, strabismic disorders, accommodative disorders, vergence disorders, amblyopia and nystagmus.
    - 11.6 Binocular optical defects - clinical investigatoin and treatment. Binocular muscular anomalies-heterophoria-the causes of imbalance, exophoria, esophoria, hyperphoria, cyclophoria, symptoms of heterophoria, treatment.
    - 11.7 Binocular muscular anomalis-heterotropia—the vision in concomitant strabismus, treatment.
    - 11.8 Binocular muscular co-ordination-convergence-voluntary and reflex convergence, reflex convergence, the measurement of convergence, the relation between accommodation and convergence, binocular accommodation, fatigue of convergence.

12. **Geriatric optometry and vision care**
    - 12.1 Anatomic, physiological and visual changes with age.
    - 12.2 Management of visual disorders in aging population and counseling.

13. **Community optometry**
    - 13.1 Definition, components, concepts, importance of community health diagnosis.
    - 13.2 Program related to elimination of eye and vision related problems.
    - 13.3 Nutritional deficiencies and its consequence in vision.

14. **Ethics in Optometry:** National eye health policies, Code of conducts of health systems and councils of Nepal. World Council of Optometry (WCO).

15. **General knowledge about Civil Service Hospital and its Bylaws**