

**COURSE NAME: DIPLOMA IN OPHTHALMIC TECHNOLOGY**

**YEAR I**

<b>Course Code</b>	<b>Course Title</b>	<b>Theory/ Practical</b>	<b>Continuous Assessment (Internals)</b>	<b>Credits</b>
ANT12204	Human Anatomy and Physiology	70	30	5
OPH12202	Ocular Anatomy and Physiology	70	30	5
OPH12203	General and Ocular Biochemistry	70	30	5
OPH12204	Physical and Visual Optics	70	30	5
HHM12201	General Principles of Hospital Practice and Patient Care	70	30	4
ANT12204P	Human Anatomy and Physiology (P)	35	15	3
OPH12204P	Physical and Visual Optics (P)	35	15	3
<b>Total</b>		<b>600</b>		<b>30</b>

**YEAR II**

<b>Course Code</b>	<b>Course Title</b>	<b>Theory/Prac tical</b>	<b>Continuous Assessment (Internals)</b>	<b>Credits</b>
OPH12305	Optometric Optics	70	30	4
OPH12306	Ocular Microbiology and Ocular Pathology	70	30	4
OPH12307	Ocular Diseases and Pharmacology	70	30	4
OPH12308	Geriatric and Pediatric Optometry	70	30	4
OPH12309	Contact Lenses and Low Vision Aids	70	30	4
OPH12305P	Optometric Optics (P)	35	15	2
OPH12306P	Ocular Microbiology and Ocular Pathology (P)	35	15	2
OPH12308P	Geriatric and Pediatric Optometry (P)	35	15	2
OPH12309P	Contact Lenses and Low Vision Aids (P)	35	15	2
TRN12301	Hospital Training	100		2
<b>Total</b>		<b>800</b>		<b>30</b>

YEAR I

**HUMAN ANATOMY AND PHYSIOLOGY – ANT12204**

UNIT	CONTENT
1.	<p><b>Human Anatomy &amp; Physiology:</b> a general view: 1) Organization of Organism: Cell – structure and function, Tissue – classification and function; microscopic structure of each type; 2) Human Anatomy- Introduction, Subdivisions of anatomy, Anatomical nomenclature - Terms of position, location and fundamental planes, Clinical terms; Introduction, Definition, Difference between human anatomy and physiology, Homeostasis, Body fluid, Transport through cell membrane - Passive Processes, The Principle of Diffusion, Simple diffusion, Facilitated diffusion Osmosis, Active Processes - Active Transport , Transport in Vesicles, The Primary Tissue, Organs and systems.</p>
2.	<p><b>The Skeleto-Muscular System:</b> Brief discussion over skeletal system - Classification of skeleton- Axial and Appendicular; Major components of skeleton system- a) Bone- definition, synonym; Composition; Special features &amp; Function; Classification; bone marrow, bone growth &amp; ossification; features of a long bone; b) Cartilage-definition; Components and classification; Overview of Osteology of bones of— i) Upper limb - (Clavicle, Scapula, Humerus, Radius &amp; Ulna and carpals), ii) Lower limb (Femur, Patella, Tibia &amp; Fibula and tarsals) iii) Thorax - (sternum &amp; ribs), iv) Abdomen- Pelvis, v) Skull bones; Cranial bones (Frontal, Parietal, Temporal, Occipital); Facial bones- (Maxilla and Mandible) - their position, orientation, side determination &amp; ligaments attached.</p> <p>Joints - Definition of Joints, Functions, Classification of Joints based on –Structure and Function.</p> <p>Muscular system - Brief introduction of muscular system, muscle tissue types, General discussion of skeletal muscles, Brief knowledge of - Appendicular muscles &amp; Axial muscles, microscopic structure of – skeletal, smooth and cardiac muscle &amp; compact bone.</p> <p>Muscular Physiology - Functions and differences of skeletal, smooth and cardiac muscles - Properties of muscle excitability and contractility, summation of stimuli, summation of contractions, effects of repeated stimuli, genesis of tetanus, onset of fatigue, refractory period, tonicity, conductivity, extensibility and elasticity.</p>
3.	<p><b>The Circulatory System:</b> Brief discussion about basics of circulatory system – components of circulatory system- structure of artery, vein, capillaries sinusoids; The Heart – Brief discussion about- General features of Heart; Shape and Size of Heart; Position of heart- general overview on- Mediastinum and relations of heart; Pericardium; Layers of heart-epicardium, myocardium and endocardium; Cardiac muscles; Chambers of heart and associated blood vessels; Valves of heart; Blood supply of Heart; vessels related to heart; Conduction system of heart; Functions of heart. Brief discussion over major arteries and veins of the body.</p> <p>Lymphatic system - Introduction to lymphatic system, brief overview of regional lymph nodes &amp; lymphatic organs. Lymph, lymphatic circulation, functions of lymph.</p> <p>Cardio Vascular System Physiology - Functions of Heart &amp; blood vessels (artery, vein and capillary), Blood circulation through heart, Blood Pressure - regulation &amp; controlling factors, ECG Cardiac cycle Cardiac cycle and cardiac output. Blood Vascular System - Functions of blood vessels (artery &amp; vein), Function of capillaries, Differences between artery &amp; vein, Composition and functions of blood.</p>

	Plasma proteins – normal values, origin and functions, Hemoglobin - Origin, formation, functions, Erythrocyte sedimentation rate (ESR) and its significance, Hematocrit: MCH, MCHC PCV and MCV.
4.	<b>The Respiratory System:</b> General discussion of respiratory system - cellular respiration; Brief knowledge of classification of respiratory system - upper conducting part & lower respiratory part; Brief discussion over anatomy of -larynx, trachea and bronchial tree; Lungs- anatomical position, relations, lobes, fissures, broncho-pulmonary segments, Pleura- Layers of pleura and Pleural cavities; microscopic structure of – trachea and lungs. Respiratory system Physiology - Respiratory system physiology, introduction, measurements of respiratory rates and volumes, gas laws, gas exchange, oxygen and carbon dioxide transport in the blood.
5.	<b>The Gastro-intestinal System:</b> General introduction of digestive system; Brief discussion over anatomy of – 1) The alimentary canal or GI tract (gastrointestinal tract): Mouth, Pharynx, Esophagus, Stomach, Small intestine, Large intestine & Anus; 2) The accessory digestive organs- brief discussion over –Teeth, tongue, Salivary glands, Gallbladder, Liver and Pancreas. GI system Physiology: Physiological anatomy of GIT. Digestion of food in the mouth (mastication), stomach, and intestine, Absorption of nutrients from digested food. Role of bile in the digestive process.
6.	<b>The Urinary System:</b> General concept of Urinary system; Brief discussion over anatomy of – a) Kidney-anatomical position, general features & structure of nephron, b) Ureter- general features and constrictions, c) Urinary bladder- anatomical position, general features & relations, d) Urethra- general features in males and females; Renal System Physiology - Function of kidney, Urine formation (filtration, re-absorption and secretion), Anomalies in urine concentration.
7.	<b>The Genital System:</b> Brief discussion over anatomy of – a) Male reproductive system - General features of primary & secondary reproductive organs, b) Female reproductive system - General features of primary & secondary reproductive organs; Reproductive system Physiology - Physiological anatomy of male and female reproductive organs; Brief overview of the formation of semen and spermatogenesis; Brief account of the menstrual cycle.
8.	<b>The Nervous System:</b> General discussion of nervous system; Classification of nervous system- a) Central Nervous System, Spinal cord: General features and functions, Brain- parts of brain, gyri, sulci, fissures, lobes, important sensory and motor areas, sensory homunculus, CSF and blood brain barrier; b) Peripheral Nervous System- brief discussion of cranial and spinal nerves. Brief discussion over major nerve plexus of body- brachial and lumbo-sacral plexus. Neuro-Physiology - Conduction velocity of nerve impulse in relation to myelination and diameter of nerve fibers, Properties of nerve fibers – excitability, conductivity, accommodation, adaptation, summation, refractory period, indefatigability, Injury to peripheral nerves – degeneration and regeneration, Automatic nervous system – Physiological effect of Autonomic Nervous System - sympathetic & parasympathetic response, Integration & control of autonomic function- autonomic Reflexes, autonomic control by higher centers; Neural Transmission- Modes of transmission, sympathetic & parasympathetic response, Synaptic transmission-Electrical synaptic transmission & chemical synaptic transmission.
9.	<b>The Endocrine System:</b> General overview of endocrine system; General anatomical features and hormones secreted by- a) Pituitary, b) Thyroid, c) Parathyroid, d) Adrenal glands; Endocrine System Physiology - Introduction to the endocrine system, endocrine functions, endocrine glands and their functions.
10.	<b>The Special Senses:</b> Brief introduction; Types of special senses- a) Chemical senses, b) Vision, c) Ear; General anatomical overview of eyes, ear, nose and tongue; Physiology of Special Senses - Physiology of sense organ, Traditional senses- Hearing, Taste, Smell, Touch, Vision, Other senses- Balance and acceleration, Temperature, kinesthetic sense, pain.
11.	<b>Embryology &amp; Development:</b> Definition and brief introduction of Embryology; Significance of Embryology; Developmental periods; Mechanism of Gametogenesis; Structure of Ovum & Sperm; Fertilization; Brief discussion on – a) Cleavage of zygote, b) Blastocyst Formation, c) Implantation, d) Bilaminar Germ Disc, e) Gastrulation, f) Neurulation, g) Development of

	somites, h) Organogenesis, i) Folding of embryo, j) Germ layer derivatives, k) Placenta, l) Parturition, m) Amnion & amniotic fluid, n)Yolk sac, o) Allantois, p) Multiple pregnancies.
12.	<b>Fluids, Electrolytes and Acid-base Balance:</b> Regulation of extracellular fluid osmolarity and sodium concentration; Integration of renal mechanisms for control of blood volume and ECF, renal regulation of potassium, calcium, phosphate, and magnesium; Regulation of acid base balance.

## **HUMAN ANATOMY AND PHYSIOLOGY (P) – ANT12204P**

1. Histology
  - a) Histotechniques
  - b) Microscope
  - c) Histology of Skeletal muscle
  - d) Histology of Cardiac muscle
  - e) Histology of Smooth muscle
  - f) Histology of Bone
  - g) Histology of Hyaline cartilage
  - h) Histology of Elastic cartilage
  - i) Histology of Fibro cartilage
  - j) Histology of artery
  - k) Histology of Vein
  - l) Histology of Lung

- m) Histology of Trachea
  - n) Histology of Eye
  - o) Cornea
  - p) Retina
  - q) Optic nerve
2. Osteology
    - a) Appendicular skeleton
    - b) Axial skeleton
  3. Specimen
    - a) Heart
    - b) Lung
    - c) Stomach
    - d) Kidney
    - e) Liver
    - f) Eye
    - g) Brain
  4. Study and Care of Microscope.
  5. Hemocytometer.
  6. Determination of Erythrocyte Sedimentation Rate (ESR) Packed Cell Volume (PCV).
  7. Estimation of Hemoglobin Concentration.
  8. Total RBC Count.
  9. Determination of Red Blood Cell Indices.
  10. Total Leukocyte Counts.
  11. Preparation and Examination of Blood Smear & Differential Leukocyte Count (DLC).
  12. Blood Pressure Measurement.
  13. Determination of Blood Group.
  14. Determination of Bleeding Time and Clotting Time.

## OCULAR ANATOMY AND PHYSIOLOGY – OPH12202

UNIT	CONTENT
<b>SECTION A - OCULAR ANATOMY</b>	
1.	<b>Orbit and its Immediate Relations:</b> Spaces of orbit, orbit apertures, orbital fat & reticular tissue, contents of the orbit, bony orbit- shape, size, walls of the orbit, base and apex of the orbit; Orbital fascia- fascia bulbi, fascial sheaths of extraocular muscles, intermuscular septa; Orbital nerve- Occulomotor, Trochlear, Abducent, Trigeminal; Fascial nerves- their functional components and clinical aspects; Ocular Muscles- Extraocular muscles, nerve supply, motor nuclei, supra nuclear motor centers.
2.	<b>Lids and Eyelid Glands :</b> Lids – structures of lids, skin, subcutaneous areolar layer, layer of striated muscle, submuscular areolar tissue, fibrous layer; Eyelid glands- Meibomian glands, Glands of Zeis, and Glands of Moll; nerve supply, blood supply and lymphatic drainage of lids.
3.	<b>Conjunctiva Cornea &amp; Sclera:</b> Conjunctiva - Brief discussion, parts of conjunctiva- Palpebral, Bulbar; conjunctival fornix, Microscopic structure of conjunctiva- Epithelium, Substantia propria, conjunctival glands, Henley’s glands, Manz glands, blood and nerve supply of conjunctiva, caruncle, Plia Semilunaris; Cornea -Structural layers of cornea, Corneal Transparency and nerve supply of the cornea; Sclera- Episclera, Sclera proper, Lamina fusca, Blood and nerve supply of the sclera.
4.	<b>Lens and Zonule:</b> Structure of the lens – capsule, Ant epithelium, lens fibers, Ciliaryzonules – structure gross appearance, Arrangement of zonules fibers.
5.	<b>Uveal Tract (Iris, Ciliary body, Choroid):</b> Structure and function of Iris, ciliary body, choroids; Blood supply to uveal structure; venous drainage system.
6.	<b>Retina:</b> Anatomical structure of retina, fovea centralis, optic nerve optic chaisma optic tracts, Lateral Geniculate body, optic radiation, Arrangement of nerve fibers.
7.	<b>Aqueous &amp; Anterior Chamber and its Angle &amp; Vitreous Humour of Eye:</b> Aqueous & Anterior chamber and its angle - Formation of Aqueous humour, Drainage of aqueous humor, angle of the anterior chamber, Trabecular meshwork, Canal of Schlemm, Schwalbe’s line. Vitreous humour - Composition and formation of vitreous, Hyaloidean vitreous, Vitreous cells and functions
8.	<b>Lacrimal Apparatus:</b> Lacrimal Gland; Lacrimal Sac; Nasolacrimal Duct; Nerve Supply of Lacrimal Apparatus.
9.	<b>Embryology of the Eye in General:</b> Formation of optic cup, optic vesicle & optic stalk, lens vesicle; changes in associated mesoderm, development of various structure of eye ball – sclera, cornea, iris, lens, ciliary body, vitreous, retina, optic nerve, choroids Growth and development of other structures of eyeball – eyelids, lacrimal apparatus, extra-ocular muscles & orbit.
<b>SECTION B - OCULAR PHYSIOLOGY</b>	
1	<b>General Physiology of the Eye - An Introduction:</b> Maintenance of Transparency of the Cornea; Physiology of corneal transparency & hydration, Maurice theory and Goldman’s theory; Maintenance of Transparency of the Lens; Function of lens, Lens transparency, Changes in ageing lens, Process of Cataract.
2	<b>Uveal Tract:</b> Functions of Uveal meshwork Uveo-scleral drainage Schlemm’s canal switch; Aqueous humour - Function of Aqueous humour, Drainage & circulation of Aqueous Humor, Rates of production & flow; Vitreous Humour - Physiology & function of vitreous humour, Optical role of vitreous humour; Blood circulation in the eye - Regulation of ocular circulation, blood-ocular barrier (Blood-retinal, blood Vitreous & blood aqueous barrier).
3	<b>Protective Mechanism of the Eye:</b> Blinking - muscles of lid closer & lid opening; Lacrimation – Lacrimal glands, Pre corneal tear film, Lachrymal secretion of 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).

4	<b>Ocular Motor System:</b> Mechanics of actions of extra ocular muscles, Physiology of ocular movement – Basic Kinematics, (position of gaze, Fick’s axes), Supra nuclear control of eye movements; Monocular Movements - Adduction, Abduction, supraduction, Infraduction, Incycloduction, excycloduction); Binocular Movements –Versions- (saccadic & pursuit movement, position maintenance movements, stabilization movements & their characteristics); Vergences – (Convergence, divergence, vertical veigeance); Intraocular pressure - Features of normal IOP, Factors influencing the IOP, Control of IOP, Measurement of IOP.
5	<b>Pupil:</b> Physiological changes in pupil size – Isocoria, Pupillary unrest, Hippies; Pupillary reflex – Light reflex, Near reflex, Darkness reflex , Psycho sensory reflex, Lid closure reflex; 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.
6	<b>Color Vision:</b> Physiological, Photochemical & neurological basis of color vision; Electrophysiology of color vision, Granit’s modulator and dominator theory, Purkinje phenomenon Young-Helmholtz theory, Color blindness, Neural analysis; Geniculate cortex: Structure of geniculate cortex, Electrophysiology, retinal projection, function of visual cortex; Visual perception: 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), Spatial analysis, Double pathway to higher visual centers.

## GENERAL AND OCULAR BIOCHEMISTRY – OPH12203

UNIT	CONTENT
1.	<b>Amino Acids and Protein Structure:</b> Amino acids, protein structure, amino acids- Functions, Classification, properties; Proteins- Primary, Secondary, tertiary & quaternary structures & the bond involves.
2.	<b>General Metabolism:</b> Basic concept & metabolism of carbohydrate, protein & fat; Process of glycolysis; TCA cycle - significance, Non protein Nitrogen, Nitrogen balance, Metabolism of acid acids, Transamination, Deamination.
3.	<b>Brief Outline: Enzyme and Vitamins:</b> General characteristics; Factors affecting enzymatic activity; Kinetics of enzyme; Michaelis Menten equation; Line We Water & fat soluble vitamins, Vitamins - A, D, E, K, P, C, B complex- source, daily requirement, metabolism, functions & deficiency aver Burk plot; <b>Enzyme Inhibition-</b> Reversible & Irreversible.
4.	<b>Oxygen Transporting Protein:</b> Hemoglobin & Myoglobin - Structure & their characteristics

	comparison between hemoglobin & myoglobin; Oxygen transporting mechanism of hemoglobin affinity for oxygen.
5.	<b>Basic Outline of Hormone Action:</b> Physical & Chemical Characteristics of hormone; Types of hormone; General mechanism of hormone action; Source & importance of different hormones- STH, ACTH, GTH, T4, parathyroid hormone, Insulin, Glucagon, Glucocorticoid, Mineralocorticoid, Melatonin, Estrogen, Progesteron, Testosterone & HC.
6.	<b>Techniques of Clinical Biochemistry:</b> Estimation of Blood sugar, urea, creatinine, bilirubin; Techniques - colloidal state, gel, emulsion, dialysis, electrophoresis, pH buffers, mode of buffer action, molar and percentage solutions, photometry, colorimetry & spectrophotometry.
7.	<b>Cornea &amp; Lens:</b> Biochemical composition of cornea; Sources of nutrients - Oxygen, Glucose, Amino acid, Metabolic pathway in cornea - Glycolysis, HMP shunt; Biochemical composition of lens; Lens protein - their types & characteristics; Lens metabolism- carbohydrate metabolism, protein metabolism; Cataract- due to biochemical defects of lens antioxidant mechanism in the lens.
8.	<b>Tear Film:</b> Function of Tear film; Different layers of tear film; Chemical composition of tears, Tear film abnormalities tests for film adequacy.
9.	<b>Biochemistry of the Visual Process:</b> Photopigments - Rhodopsin & Iodopsin; Chemical nature of Rhodopsin, visual cycle (Bleaching of rhodopsin, Transducin cycle, Role of phosphodiesterases).

## PHYSICAL AND VISUAL OPTICS – OPH12204

UNIT	CONTENT
1.	<b>Nature of Light:</b> Properties of light, principles of reflection of light, refraction of light; Snell's Law - relationship between angles of incidence and refraction of rays, critical angle, total internal reflection, refraction by plane parallel slab of glass; Quantum theory – dual nature of light; Ray and wave velocity; Wave nature of light – short comings of wave theory; Scattering of light- Rayleigh's and Raman's scattering Principles; Principle of LASER – concept and use.
2.	<b>Interference:</b> Theory of interference fringes; Description of the phenomena, Young's; experiments, coherent sources, phase and path difference and intensity; Interference due to reflected and transmitted light; Colors of thin films – wedge shaped thin films – testing of plainness of surface; Newton's rings experiment and refractive index of liquid; Non-reflecting films.



3.	<b>Spectrum &amp; Diffraction:</b> Spectrum; Sources of spectrum; Emission and absorption spectra; Classification of visible, ultra violet, infrared, electromagnetic spectrum; Diffraction, Single slit, qualitative and quantitative; Circular aperture; Double slit pattern; Multiple slit grating.
4.	<b>Polarization:</b> Basic principles of holography; Circular & elliptic polarization production, detection and its behavior; Double refraction, principal plans, Nicol prism – plane polarization; Polarization by selective absorption – dichorism; Polarization of transverse waves.
5.	<b>Optics of Ocular Structure:</b> Tears; Cornea; Aqueous; Crystalline lens; Vitreous; Schematic and reduced eye.
6.	<b>Refractive Conditions of Eye:</b> Emmetropia; Myopia; Hyperopia; Astigmatism.
7.	<b>Refractive Anomalies and Their Cause:</b> Aetiology of refractive anomalies; Contributing variabilites and their ranges; Populating distributions of anomalies; Optical component measurements; Growth of the eye in relation to refractive errors.
8.	<b>Accommodation and Convergence:</b> Far and Near point of accommodation, range of accommodation amplitude; Methods of measurement of Accommodation; Near point of convergence and its significance; Methods of measurements of Convergence; Accommodative Convergence Accommodation ratio (AC/A); Anomalies of accommodation; Anomalies of convergence.
9.	<b>Objective and Subjective Refraction:</b> Retinoscopy – speed of reflex and optimum condition; Retinoscopy – design consideration; Review of objective refractive methods; Subjective Refraction - finding Best vision Sphere, determine axis and power of cylinder by JCC, refine sphere, duochrome test, binocular balancing; Fogging method; Difficulties in subjective tests; Transposition of lenses; Spherical equivalent.

### **PHYSICAL AND VISUAL OPTICS (P) – OPH12204P**

1. To determine the wavelength of a monochromatic light source with the help of Fresnel's Biprism.
2. To determine the radius of curvature of convex surface of a lens by Newton's ring method.
3. To study the diffraction through a single slit & to determine its width.
4. Determination of the wavelength of monochromatic light using diffraction grating.
5. Measurement of Near Point of Convergence.
6. Measurement of Near Point of Accommodation.
7. Measurement of Amplitude of Accommodation.
8. Determining objective value of Refraction by Retinoscopy.
9. Procedures of Subjective Refraction.

## GENERAL PRINCIPLES OF HOSPITAL PRACTICE AND PATIENT CARE – HHM12201

UNIT	CONTENT
1	<b>Hospital Structure and Organization:</b> Overview of hospital structure, hospital procedure, professional qualities; Communication and relational skills –development of appropriate communication skills with patients, verbal and non verbal communication, appearance and behavior; Professional attitude of the technologist to patients and other members of the staff; Records and reports – records relating to patients and departmental statistics; Minimizing waiting time out- patient and follow-up clinics, stock-taking and stock keeping; Administrative policies and disciplinary procedures; Importance of reporting.
2	<b>Care of Patient:</b> Contact with the patient and family members in the respective department; Communication with the patient and family members; Patient transfer technique; Restraint techniques – consideration to be taken for the geriatric, paediatric, trauma, emotionally disturbed, and anaesthetized patients; Specific patient conditions – essentials of care of patients on ventilator, tracheostomy, tubes and catheters, nasogastric tubes, chest tubes, intravenous lines, oxygen & casts; Basics on hygiene and maintenance of hygiene; Essential care of patient with a colostomy, providing bed pans and urinals; Basics of nursing care – measurement of vital signs – sterile dressing.
3	<b>First Aid and Basic Life Support:</b> Aims and objectives of first aid; wounds and bleeding, dressing and bandages; pressure and splints, supports etc. shock; insensibility; asphyxia; convulsion; resuscitation, use of suction apparatus, drug reactions; prophylactic measures; administration of oxygen; electric shock; burns; scalds; haemorrhage; pressure points; compression band. Fractures; splints, bandaging; dressing, foreign bodies; poisons. Introduction to BLS, indications for BLS, and the process of BLS. Recovery position.
4	<b>Infection Control Practices:</b> Definition – introduction to the types of micro organisms – Bacteria – their nature and appearance – spread of infections – auto-infection or cross infection; asepsis and antisepsis; Infection pathogens; Communicable diseases cross infection and prevention, patient hygiene, personal hygiene, departmental hygiene, handling of infectious patients in the department; Application of asepsis, inflammation and infection process; Hospital acquired infection; Universal precautions and biomedical waste management. <b>Principle of</b>
5	<b>Asepsis:</b> Sterilization – methods of sterilization; use of central sterile supply department of instruments, surgical dressing in common use including filamented swabs, elementary operating theatre procedure, general abdominal preparation, clothing of a patient.
6	<b>Maintenance of Medications in the Department:</b> Storage: classification; labeling and checking, regulations regarding dangerous and other drugs; units of measurements, special drugs, anti-depressive, anti-hypertensive etc.
7	<b>Specialized Investigations:</b> Care of patients - patients care during investigation; GI tract, renal tract, biliary tract, respiratory tract, gynecology, cardiovascular, lymphatic system, CNS.
8	<b>Medico – Legal Issues:</b> Medico – Legal considerations – clinical and ethical responsibilities, ethical law and professional etiquettes applied to members of profession associated with medicine, misconduct and malpractice; Handling female patients, practice in pregnancy – decision making.
9	<b>Nursing, Handling and Care of Patients:</b> Hospital and developmental procedure; Hospital staffing and organization, records and departmental statistics, appoints, stock taking and stock keeping, reception, elementary hygiene.

**DIPLOMA IN OPHTHALMIC  
TECHNOLOGY – II YEAR**

**OPTOMETRIC OPTICS – OPH12305**

UNIT	CONTENT
1.	<b>Introduction to Optometric Optics:</b> Introduction and brief discussion - Light, Mirror, Reflection, refraction and absorption.
2.	<b>Ophthalmic Lenses:</b> Definition of prisms, Units of prism power; Thickness difference and Base apex notations; Dividing, Compounding and Resolving prisms; Rotary prisms and effective prism power in near vision; Prismatic effect, decentration, Prentice Rule; Lens Thickness in High Powers; Effectivity, Vertex Powers and Accurate Transposition of lenses.
3.	<b>Types of Lenses:</b> Aspheric lenses; Sphero-cylindrical lenses; High index lenses; Bifocal and Multifocal lenses; Photochromic lenses; Tinted lenses; Toric lenses; Anti reflection coating; Field of view of lenses; Size, shape and mounting of ophthalmic lenses.
4.	<b>Special Purpose Lenses:</b> Describe and explain the principles of: a) Lenses for use under water, b) Recumbent prisms, c) Fresnel lenses, d) Fresnel prisms, e) Chavasse lenses, f) Frosted lenses, g) Occluders.
5.	<b>Lens Power Determination:</b> Trial lens method; Manual focimeter; Automated focimeter; Projection focimeter.
6.	<b>Optical Appliances:</b> Types, making of spectacles; Manufacture of glass - describe the important physical properties of the various materials from which specific lenses are made; Lens surfacing; Principle of surface generation and glass cements.
7.	<b>Fitting Spectacles &amp; Facial Measurements:</b> Ophthalmic blanks; Surfacing and polishing; Glazing; Classification of spectacle frames-material, weight, temple, position and coloration; Frame construction & material; Frame measurements and marking; Frame Adjustments and Tools.
8.	<b>Dispensing Optics/Spectacles:</b> Measurements for ordering spectacles-IPD, marking center, vertex distance, calculations; Measurements for fitting special lenses-bifocals, Multifocals, prism, lenses, etc.
9.	<b>Aberrations:</b> Spherical aberration; Chromatic aberration; Coma; Oblique astigmatism; Curvature of field; Distortion.

## OPTOMETRIC OPTICS (P) – OPH12305P

1. Hand neutralization of the lenses.
2. Keratometry.
3. Lensometry.
4. Measurement of IPD.
5. Measuring heights for Single vision, Bifocal and Multifocal lenses.
6. Marking of single vision and bifocal lenses.

## OCULAR MICROBIOLOGY AND OCULAR PATHOLOGY – OPH12306

UNIT	CONTENT
1.	<b>Introduction to Ocular Microbiology:</b> Bacterial Cell structure - Elementary idea about classification and morphological basis; Staining reactions - Gram Staining, Spore Staining, and Acid Fast Staining; Microbial growth & death - Laboratory culture; Host pathogen interactions; Antimicrobial chemotherapy; pathogenic mechanisms common to external ocular infections process; Bacterial growth - Nutritional requirements, media classification and bacterial nutritional requirements, Physical factor affecting culture media and Growth curve.
2.	<b>Microbial Infections of the Eye:</b> Bacterial Infections - Haemophilus Influenzae, Neisseria Gonorrhoeae, Chlamydia Trachomatis, and Pseudomonas; Virus - Adenoviruses, Herpes Simplex Type I, Protozoa; Bacterial Infections of the eye - Conjunctivitis (pink eye), Neonatal Gonorrheal Ophthalmia, Inclusion Conjunctivitis, Trachoma, Acanthamoeba Keratitis, Herpes simplex Keratitis.
3.	<b>Viral infection of the Eye:</b> Elementary knowledge of viral-morphology - Viral genome and classification, Viral replication, Herpes viruses, Hepatitis viruses, Human immunodeficiency viruses; Infectious diseases caused by bacteria, virus and fungi; Infectious eye diseases in hot climate as in India.
4.	<b>Aseptic Techniques:</b> Elementary idea about bactericidal agents - Phenol, alcohol, phenol coefficient; Sterilization - Principles, types & methods; Antibiotics - Bacteriostatic and Bactericidal effects, microbiological techniques.
5.	<b>Immunology:</b> Antigen; Antibody; Structure and function of immune system – Organs of immune system, cells of immune system, functions of immune system; Routine serological tests; Hypersensitivity; Autoimmune diseases affecting the eye.
6.	<b>Introduction to Pathology:</b> General introduction to Inflammation and repair – Infections, Leprosy, fungal infection, virus, chlamydia, genetic disorders; Haematology - Anaemia, Leukemia, Bleeding disorders; Circulatory disturbances - Shock, Thrombosis, Infarction, Embolism, Degeneration, Apoptosis, and Metabolic disorders; Inflammation and repair - Circulatory disturbances, Shock, edema, Thrombosis, Embolism, and Infarction; Acute bacterial infections - Specific Infection, Tuberculosis, Leprosy, Fungal Infection, Viral and Chlamydial Infection.
7.	<b>Neoplasia:</b> Introduction to Neoplasia - Definitions of Neoplasia; Classifications of Neoplasia, Behaviour of benign and Malignant; Neoplasm; Spread of Tumours; Etiopathogenesis; Diagnostic methods.
8.	<b>Clinical Pathology:</b> Introduction to Clinical Pathology - Functioning of laboratory, Collection of blood sample, Haematology Technique - Blood Cells and blood collection techniques; Haemoglobin estimation - Total leucocyte count, Differential leucocyte count, Erythrocyte sedimentation rate; Peripheral blood film – staining, significance of a peripheral smear -

	Bleeding time, clotting time, Examination of Urine.
9.	<b>Ocular Pathology:</b> Infection; Degenerative conditions; Ocular manifestation in systemic disease; Cataract; Tumours.

## **OCULAR MICROBIOLOGY AND OCULAR PATHOLOGY (P) – OPH12306P**

1. Sterilization.
2. Gram staining.
3. Collection of blood.
4. A peripheral blood smears preparation.
5. Estimation of Hb.
6. Determination of BT, CT, Whole blood clotting time.
7. Determination of ESR.
8. Differential count of white blood cells.
9. Detection of Hepatitis C Virus (Hcv) Antibodies.

## **OCULAR DISEASES AND PHARMACOLOGY – OPH12307**

UNIT	CONTENT
1.	<b>Diseases of the Eyelids and Lacrimal System:</b> Congenital and developmental anomalies of the eyelids; Blepharospasm, Entropion and ectropion, Trichiasis and symblepharon, Eyelid inflammations; Ptosis; Lacrimal System; Method of Lacrimal evaluation; Congenital and developmental anomalies of the Lacrimal system; Lacrimal obstruction; Lacrimal sac tumors; Lacrimal trauma.
2.	<b>Diseases of the Orbit – Sclera:</b> Staphyloma; Scleritis; Episcleritis; Orbital abnormalities; Congenital and developmental anomalies of the orbit; Congenital tumours; Orbital

	inflammations; Sinus disorders affecting the orbit; Orbital trauma.
3.	<b>Diseases of the Conjunctiva, Cornea, Uvea:</b> Inflammation; Therapeutic principles; Specific inflammatory diseases.
4.	<b>Cataract:</b> Developmental abnormalities; Acquired lenticular defects; Cataract.
5.	<b>Retina:</b> Macular degeneration; Hypertensive retinopathy; Peripheral retinal degenerations; Hereditary macular disorders; Retinal detachment; Intraocular foreign bodies; Photocoagulation; Retinal vascular disease; Retinal tumors and retinoblastoma; Retinal inflammations.
6.	<b>Trauma and Blindness:</b> Anterior segment trauma; Posterior segment trauma; Glaucoma – types: Open angle glaucoma; Narrow angle glaucoma.
7.	<b>Neuro-Ophthalmic Disorders:</b> Neuro-ophthalmic examination; Nystagmus; Gaze palsies; III, IV, VI Cranial abnormalities; Optic neuritis; Papilledema; Diplopia; Anisocoria; Orbital cellulites; Myesthenia gravis.
8.	<b>General Pharmacology:</b> Pharmacokinetics; pharmacodynamics; Drugs acting on the autonomic nervous system; Analgetics and local anesthetics; Antipyretics and anti-inflammatory drugs; antibiotics; Antiviral drugs; Anti-allergic drugs; Drugs affecting respiratory and cardiovascular system; Antiseptics, disinfectants, Preservatives; Common systemic side effects of medications, and general health.
9.	<b>Ocular Pharmacology:</b> Anti-microbials; Anti-inflammatory drugs; Autonomic drugs and anti-glaucoma agents; Drugs for dry eye and diagnostic agents; Ocular anaesthetics; Ophthalmic prescriptions.

## GERIATRIC AND PEDIATRIC OPTOMETRY – OPH12308

UNIT	CONTENT
1.	<b>History:</b> Genetic factors; Perinatal factors; Prenatal factors; Postnatal factors; Measurement of visual acuity.
2.	<b>Normal Appearance, Pathology and Structural Anomalies:</b> Orbit; Eyelids; Lacrimal system; Conjunctiva; Cornea; Sclera; Anterior chamber, uveal tract, pupils; Lens, vitreous, fundus; Oculomotor system.
3.	<b>Refractive Status Measurement:</b> Measurement of refractive status.
4.	<b>Binocular Status Determination:</b> Determining binocular status.
5.	<b>Sensory and Motor Adaptability Determination:</b> Determining sensory motor adaptability.
6.	<b>Compensatory Treatment and Remedial Therapy:</b> Myopia; Pseudomyopia; Hyperopia;

	Astigmatism; Anisometropis; Amblyopia; Remedial and compensatory treatment for strabismus and nystagmus; Vergence and accommodation.
7.	<b>Geriatric Optometry:</b> Structural changes in eye; Physiological changes in eye; Optical and refractive changes in eye; Aphakia, Pseudophakia – its correction.
8.	<b>Ocular Diseases Common in Old Eye:</b> Cataract, glaucoma, macular disorders, vascular diseases of the eye; Special considerations in ophthalmic dispensing to the elderly.
9.	<b>Aging and Its Management:</b> Management of visual problems of aging; How to carry on one's visual task overcoming the problems of aging?

## **GERIATRIC AND PEDIATRIC OPTOMETRY (P) – OPH12308P**

1. Syringing of lacrimal passage.
2. Assessment of corneal sensitivity.
3. Assessment of pupil.
4. Ocular motility test.
5. Hirschberg corneal reflex test.
6. Cover test.

## **CONTACT LENSES AND LOW VISION AIDS – OPH12309**

UNIT	CONTENT
1.	<b>Contact Lenses:</b> Brief introduction; Lens types and materials: Hard lenses, Haptics, Lathe cut, Moulded, and Spin cast soft lenses.
2.	<b>Optics of Contact Lenses:</b> Curves; Zones; Widths and tear lens effects; Sagittal depth Centre and edge thickness; Flex; Asphericity and toric designs; Quadrantic specific designs; Oblique geometries with reverse curves.
3.	<b>Theories and Methods of Fitting:</b> Lens design; Specifications of orders; Lens verification and evaluation; Insertion and removal techniques; Design of wearing schedules; Fluoresce in evaluation and fitting criteria.
4.	<b>Lens Selection:</b> Patient's History; Analysis of primary care data; Correlations of data; Facial physiognomy; Contraindications; Anterior segment examination; Measurement of anterior



	segment; Patient handling and control.
5.	<b>Care of Lenses:</b> Handling; Cleaning; Preservatives available; Disinfection methods & Solutions.
6.	<b>Follow-up Care:</b> Adaptation; Physiologic and post-fitting complications; Allergic responses; Lens changes; Mechanical problems.
7.	<b>Bifocal and Astigmatic Contact Lenses:</b> Brief discussion; Types; Basis of selection and adaptation; Techniques of fitting.
8.	<b>Specially Designed Lenses and Fitting Procedures:</b> Keratoconus; Irregular corneas; Keratoplastic; After refractive surgeries; Sports vision; Diseased and traumatic corneas; Cosmetic (prosthetic) use; Iris colour changes; Colour vision deficiencies.
9.	<b>Low Vision:</b> Defining low vision; Disorder, impairment, disability and handicap; WHO definitions; Incidence and causes; Prevalence; Causes; Visual impairment in children.
10.	<b>Measuring Visual Performance:</b> Acuity; Contrast; Glair and its effect; Reading; Quality of life.
11.	<b>Magnification:</b> Increasing object size; Decreasing viewing distance; Real image magnification; Telescopic magnification. <b>Non-optical Visual Aids:</b> Reading rectangle (typoscope); Yellow filter; Larger, illuminated
12.	watches and clocks; Writing guides; Instruments that provide voice instruction (i.e., computers); Instruments that provide voice information (i.e., clocks, timers, calculators, scales, key chains, etc.).

## **CONTACT LENSES AND LOW VISION AIDS (P) – OPH12309P**

1. Soft contact lens insertion and removal.
2. RGP contact lens insertion and removal.
3. Identification of a telescope.
4. Recording of Visual Acuity in Low Vision patient.
5. Color vision testing by D15 color vision plates.
6. Brightness acuity testing.

## **HOSPITAL TRAINING – TRN12301**

DIPLOMA IN OPHTHALMIC TECHNOLOGY – 2 YEARS