SNDT Women's University

Centre for Vocational and Technical Education

Curriculum for

B. Voc/D. Voc

in

Optometry

Degree Syllabus

SEMESTER I
GENERAL ANATOMY
SUB. CODE 1001
2hours/week- 2 credit

Sl. No.	Topics
1	Introduction to Human Anatomy: Anatomy: Definition and its relevance in medicine and optometry Planes of the body, relationship of structures, organ system
2	Skeleton System
3	Tissues of the Body: Epithelium, connective tissue, bone and cartilage, Embryology, histology, different types of each of them, types of cells, cellular differentiation and arrangements in different tissues
4	Muscles: Different types of muscles, their functional differentiation, their relationship with different structures, their neural supply
5	Blood vessels: Differentiation between arteries and veins, embryology, histology of both arteries and veins, Functional differences between the two, anatomical differences at different locations
6	Skin and appendages: Embryology, anatomical differences in different areas, functional and protective variations, innervations, relationship with muscles and nerves
7	Lymphatic system: Embryology, functions, relationship with blood vessels and organs
8	Glands: Embryology, different types of glands (exocrine and endocrine), functional differences, neural control of glands
9	Nervous system: Parts of Nervous system, cell types of nervous system, Blood-brain barrier, Reflex arc, Peripheral Nerves, Spinal nerves, Nerve fibers, Autonomic Nervous system
10	Brain and Cranial nerves: Major parts of Brain, Protective coverings of the Brain, Cerebrospinal Fluid, Brain stem, Cerebellum, Diencephalon, Cerebrum, Cranial nerves

PRACTICAL (15 Hours): Practical demonstration of each organ using specimen. If specimen for
certain organs are not available, then videos can be shown to make the student understand the anatomic structures.

GENERAL PHYSIOLOGY
SUB. CODE.1002
2hours/week- 2 credit

Sl. No.	Topics
1	CELL STRUCTURE & ORGANIZATION Tissue organization Epithelium Connective tissue –Collagen fibers –Elastic fibers –Areolar fibers Cartilage –Bone Contractile tissue –striated –skeletal –cardiac –non striated –plain –myoepithelial General principles of cell physiology Physiology of skeletal muscle
2	BLOOD: Composition Volume measurement & variations Plasma proteins –classification & functions Red blood cells –development, morphology & measurements –functions & dysfunctions. White blood cells –development –classification, morphology –functions & dysfunctions Platelets –morphology –development, functions & dysfunctions Clotting –factors –mechanism –anti- coagulants dysfunctions Blood grouping –classification –importance in transfusion, Rh factor & incompatibility Suspension stability Osmotic stability Reticulo endothelial system o Spleen o lymphatic tissue o Thymus o bone marrow o immune system o cellular o Humoral o Autoimmune
3	DIGESTION: General arrangement Salivary digestion –functions & regulations Gastric digestion –functions & regulations Pancreatic digestion –functions & regulations Intestinal digestion –functions & regulations Liver & bile Absorption Motility Deglutition Vomiting Defecation Functions of large intestine Neurohumoral regulations of alimentary functions, summary

4	EXCRETION: Body fluids –distribution, measurement & exchange, Kidney –structure of nephron –mechanism of urine formation –composition of the urine and abnormal constituents –urinary bladder & micturition
5	ENDOCRINES: Hormone mechanism –negative feed backs –tropic action –permissive action – cellular action, hypothalamic regulation Thyroid - hormones, actions, regulations Adrenal cortex - hormones, actions, regulations Adrenal medulla –hormones, actions, regulations Parathyroid - hormones, actions, regulations Islets of pancreas –hormones, actions, regulations Miscellaneous _ hormones, actions, regulations Common clinical disorders
6	REPRODUCTION: Male reproductive system –control & regulation Female reproductive system –uterus –ovaries –menstrual cycle –regulation – pregnancy & delivery –breast –family planning
7	RESPIRATION: Mechanics of respiration –pulmonary function tests –transport of respiratory gases-neural and chemical regulation of respiration –hypoxia, cyanosis, dyspnoea– asphyxia.
8	CIRCULATION: General principles Heart: myocardium –innervation –transmission of cardiac impulse- Events during cardiac cycle –cardiac output. Peripheral circulation: peripheral resistances –arterial blood pressure –measurements –factors regulation variations –capillary circulation – venous circulation. Special circulation: coronary cerebral –miscellaneous
9	ENVIRONMENTAL PHYSIOLOGY Body temperature regulation (including skin Physiology). Exposure to low and high atmospheric pressure
10	NERVOUS SYSTEM: Neuron –Conduction of impulse –synapse –receptor. Sensory organization –pathways and perception Reflexes –cerebral cortex –functions. Thalamus –Basal ganglia Cerebellum. Hypothalamus. Autonomic nervous system –motor control of movements, posture and equilibrium – conditioned reflex, eye hand co-ordination
11	SPECIAL SENSES –(Elementary) Olfaction –Taste –Hearing

PRACTICAL (Total: 15 hours)

1. Blood test: Microscope, Haemocytometer, Blood, RBC count, Hb, WBC count, Differential Count, Haematocrit demonstration, ESR, Blood group & Rh. type, Bleeding time and clotting time
2. Digestion: Test salivary digestions
3. Excretion: Examination of Urine, Specific gravity, Albumin, Sugar, Microscopic examination for cells and cysts
4. Endocrinology and Reproduction: Dry experiments in the form of cases showing different

endocrine disorders.
5. Respiratory System: Clinical examination of respiratory system, Spirometry, Breath holding test
6. Cardio Vascular System: Clinical examination of circulatory system, Measurement of blood pressure and pulse rate, Effect of exercise on blood pressure and pulse rate
7. Central Nervous System: Sensory system, Motor system, Cranial system, Superficial and deep reflexes

ENGLISH AND COMMUNICATION
SUB. CODE.1003
2hours/week- 2 credit

Functional English	Topics
Unit 1 Basics of Grammar	Vocabulary Synonyms, Antonyms, Prefix and Suffix, Homonyms,Analogies and Portmanteau words
Unit II Basics of Grammar – Part II	Active, Passive, Direct and Indirect speech, Prepositions, Conjunctions and Euphemisms
Unit III Writing Skills	Letter Writing, Email, Essay, Articles, Memos, one word substitutes, note making and Comprehension
Unit IV Writing and Reading	Summary writing, Creative writing, newspaper reading
Unit V Practical Exercise	Formal speech, Phonetics, semantics and pronunciation
Communication	
Introduction	Communication process. □ Elements of communication □ Barriers of communication and how to overcome them. □ Nuances for communicating with patients and their attenders in hospitals
Speaking	Importance of speaking efficiently □ Voice culture. □ Preparation of speech. Secrets of good delivery □ Audience psychology, handling □ Presentation skills. □ Individual feedback for each student □ Conference/Interview technique
Listening	Importance of listening □ Self-assessment □ Action plan execution. □ Barriers in listening. □ Good and persuasive listening
Reading	What is efficient and fast reading □ Awareness of existing reading habits □ Tested techniques for improving speed □ Improving concentration and comprehension through systematic study.
Non Verbal Communication	Basics of non-verbal communication □ Rapport building skills using neuro- linguistic programming (NLP)
Communication in Optometry Practice	

GEOMETRICAL OPTICS-I
SUB. CODE.1004
2hours/week- 2 credit

No.	Topics
1	Nature of light –light as electromagnetic oscillation; ideas of sinusoidal oscillations; amplitude and phase; speed of light in vacuum and other media; refractive index. Wavefronts–spherical, elliptical and plane; Curvature and vergence; rays; convergence
2	and divergence in terms of rays and vergence; vergence at a distance Refractive index; its dependence on wavelength
3	Fermat's and Huygen's Principle –Derivation of laws of reflection and refraction (Snell's law) from these principles
4	Plane mirrors –height of the mirror; rotation of the mirror
5	Reflection by a spherical mirror –paraxial approximation; sign convention; derivation of vergence equation
6	Imaging by concave mirror, convex mirror
7	Reflectivity; transmissivity; Snell's Law, Refraction at a plane surface Glass slab; displacement without deviation; displacement without dispersion Thick prisms; angle of prism; deviation produced by a prism; refractive index of the
8	prism
9	Prisms; angular dispersion; dispersive power; Abbe's number. Definition of crown and flint glasses; materials of high refractive index
10	Thin prism –definition; definition of Prism diopter; deviation produced by a thin prism; it dependence on refractive index
11	Refraction by a spherical surface; sign convention; introduction to spherical aberration using image formed by a spherical surface of a distance object; sag
12	formula
13	Paraxial approximation; derivation of vergence equation Imaging by a positive powered surface and negative powered surface Vergence at a distance formula; effectivity of a refracting surface
14	Definition of a lens as a combination of two surfaces; different types of lens shapes. Image formation by a lens by application of vergence at a distance formula; definitions of front and back vertex powers; equivalent power; first and second
15	principal planes/points; primary and secondary focal planes/points; primary and
16	secondary focal lengths
17	Newton's formula; linear magnification; angular magnification
18	Nodal Planes Thin lens as a special case of thick lens; review of sign convention
19	Imaging by a thin convex lens; image properties (real/virtual; erect/inverted; magnified/minified) for various object positions Imaging by a thin concave lens; image properties (real/virtual; erect/inverted; magnified/minified) for various object positions Prentice's Rule System of two thin lenses; review of front and back vertex powers and equivalent power, review of six cardinal points. System of more than two thin lenses; calculation of equivalent power using magnification formula

PHYSICAL OPTICS-I
SUB. CODE.1005
2hours/week- 2 credit

No.	Topics
1.	Nature of light –light as electromagnetic oscillation –wave equation; ideas of sinusoidal oscillations –simple harmonic oscillation; transverse nature of oscillation; concepts of frequency, wavelength, amplitude and phase.
2.	Sources of light; Electromagnetic Spectrum.
3.	Polarized light; linearly polarized light; and circularly polarized light.
4.	Intensity of polarized light; Malus'Law; polarizers and analyzers; Methods of producing polarized light; Brewster's angle.
5.	Birefringence; ordinary and extraordinary rays.
6.	Relationship between amplitude and intensity.
7.	Coherence; interference; constructive interference, destructive interference; fringes; fringe width.
8.	Double slits, multiple slits, gratings.
9.	Diffraction; diffraction by a circular aperture; Airy's disc
10.	Resolution of an instrument (telescope, for example); Raleigh's criterion
11.	Scattering; Raleigh's scattering; Tyndall effect.
12.	Fluorescence and Phosphorescence
13.	Basics of Lasers –coherence; population inversion; spontaneous emission; Einstein's theory of lasers.
14.	Radiometry; solid angle; radiometric units; photopic and scotopic luminous efficiency and efficacy curves; photometric units
15.	Inverse square law of photometry; Lambert's law.
16.	Other units of light measurement; retinal illumination; Trolands

PRACTICAL: Total: 15 hours

Each practical session could be evaluated for 10 marks and the total could be added to the final evaluations. These practical could be customized as per the university requirements and spaced apart conveniently. The practical to be done include the following:
1. Gratings – determination of grating constant using Sodium vapour lamp; determination of wavelengths of light from Mercury vapour lamp
2. Circular Apertures – measurements of Airy's disc for apertures of various sizes
3. Verification of Malus' Law using a polarizer – analyzer combination
4. Demonstration of birefringence using Calcite crystals
5. Measurement of the resolving power of telescopes.
6. Newton's rings
7. Demonstration of fluorescence and phosphorescence using crystals and paints

OCULAR ANATOMY
SUB. CODE.1006
2hours/week- 2 credit

1. Central nervous system:
1.1 Spinal cord and brain stem
1.2 Cerebellum
1.3 Cerebrum.
2. Orbit
2.1 Eye
2.2 Sclera
2.3 Cornea
2.4 Choroid
2.5 Ciliary body
2.6 Iris
2.7 Retina
3. Refractory media-
3.1 Aqueous humor
3.2 Anterior chamber
3.3 Posterior chamber
3.4 Lens
3.5 Vitreous body
4. Eyelids
5. Conjunctiva
6. Embryology

PRACTICAL (Total: 15 hours)

1. Eye: Practical dissection of bull's eye
2. Orbit: Practical demonstration of orbital structures.

CLINICAL OPTOMETRY –I
SUB. CODE.1007
2hours/week- 2 credit

NOS.	SKILLS	DURATION	REMARKS
1.	• OPD SET UP • RERACTION ROOM • WARD SET UP • EQUIPMENTS • OPHTHALMIC DRUGS • RETINSCOPY	1MONTH	TO OBSERVE
2.	HISTORY TAKING	2MONTH	1/DAY
3.	TORCH LIGHT EXAMINATION OF EYE	3 MONTH	5/DAY
4.	VISION TAKING	4 MONTH	10/DAY

COMPUTER SKILL
SUB. CODE.1008
1hours/week- 1 credit

1. Introduction to computer: Introduction, characteristics of computer, block diagram of computer, generations of computer, computer languages.
2. Input output devices: Input devices(keyboard, point and draw devices, data scanning devices, digitizer, electronic card reader, voice recognition devices, vision-input devices), output devices(monitors, pointers, plotters, screen image projector, voice response systems).
3. Processor and memory: The Central Processing Unit (CPU), main memory.
4. Storage Devices: Sequential and direct access devices, magnetic tape, magnetic disk, optical disk, mass storage devices.
5. Introduction of windows: History, features, desktop, taskbar, icons on the desktop, operation with folder, creating shortcuts, operation with windows (opening, closing, moving, resizing, minimizing and maximizing, etc.).
6. Introduction to MS-Word: introduction, components of a word window, creating, opening and inserting files, editing a document file, page setting and formatting the text, saving the document, spell checking, printing the document file, creating and editing of table, mail merge.

SEMESTER II

Mathematics
SUB. CODE.2001
2hours/week- 2 credit

Sr No	Topics
1	Trigonometry • angles and their measurement • trigonometric ratio of any angle. • Fundamental indentity. • Trignometric ratio of compound angle. • Addition and subtraction theorem. • Product formulae • Sum & difference form • multiple and submultiple angles • inverse trignometric functions
2	Co ordinate geometry • rectangular co ordinate system • distance formula • section formula • slope and intercept of line • variation equation of line • angle between two straight line • parallel and perpendicular line • various equation of a circle • centre and radius of a circle • tangent and normal to a circle
3	Statistics collection of data organisation of data diagrammatic representation graphical representation measure of central tendency- arithimetic mean, median, mode. Mean deviation, standard deviation. Coefficent of variation

PERSONALITY DEVELOPMENT
SUB. CODE.2002
2Hours / Week Credit 2

NO	TOPIC AND DETAILS
1	WHAT IS PERSONALITY 1) TRAITS 2) CHARACTERSTICS OF A WELL DEVELOPED PERSONALITY 3) HOW TO DEVELOPED GOOD PERSONALITY
2	COMMUNICATION – VERBAL AND NON VERBAL ART OF LISTENING SPEAKING (CLARITY OF SPEECH, APPROPRIATE WORD CHOICE) BODY LANGUAGE
3	PUBLIC SPEAKING DEBATE SPEECH GROUP OF DISCUSSION ART OF CONVERSATION
4	VOICE CULTIVATION
5	SOCIAL ETIQUETTE INTRODUCTION MEETING PEOPLE PUBLIC PLACE BEHAVIOUR
6	ELEMENTS OF HUMAN RELATIONSHIP
7	MIND SET
8	POSITIVE THINKING AND CONFIDENCE BUILDING
9	GOAL SETTING
10	CURRENT TOPICS
11	TIME, STRESS AND ANGER MANAGEMENT
12	PERSONAL HYGIENE AND PRESENTATION
13	PREPARING JOB FOR INTERVIEW

GENERAL BIOCHEMISTRY
SUB. CODE.2003
2hours/week- 2 credit

Sr no	Topics	No of hrs
	Carbohydrates:	
1	Glucose; fructose; galactose; lactose; sucrose; starch and glycogen (properties and tests, Structure and function)	6
2	Proteins: Amino acids, peptides, and proteins (general properties & tests with a few examples like glycine, trytophan, glutathione, albumin, hemoglobin, collagen)	6
3	Lipids: Fatty acids, saturated and unsaturated, cholesterol and triacyglycerol, phospholipids and plasma membrane	6
4	Vitamins: General with emphasis on A,B2, C, E and inositol (requirements, assimilation and properties)	6
5	Minerals: Na, K, Ca, P, Fe, Cu and Se.(requirements, availability and properties)	6
	Total Number of Hours	30

OCULAR PHYSIOLOGY
SUB. CODE.2004
2hours/week- 2 credit

1. Protective mechanisms in the eye: Eye lids and lacrimation, description of the globe
2. Extrinsic eye muscles, their actions and control of their movements
3. Coats of the eye ball
4. Cornea
5. Aqueous humor and vitreous: Intra ocular pressure
6. Iris and pupil
7. Crystalline lens and accommodation – presbyopia
8. Retina – structure and functions
9. Vision – general aspects of sensation
10. Pigments of the eye and photochemistry
11. The visual stimulus, refractive errors
12. Visual acuity, Vernier acuity and principle of measurement
13. Visual perception – Binocular vision, stereoscopic vision, optical illusions
14. Visual pathway, central and cerebral connections
15. Colour vision and colour defects. Theories and diagnostic tests
16. Introduction to electro physiology
17. Scotopic and Photopic vision
18. Color vision, Color mixing
19. Mechanism of accommodation
20. Retinal sensitivity and Visibility
21. Receptive stimulation and flicker
22. Ocular, movements and saccades
23. Visual perception and adaptation
24. Introduction to visual psychology (Psychophysics)

PRACTICAL: Total: 15 hours.

1. Lid movements
2. Tests for lacrimation tests
3. Extra ocular movements
4. Break up time
5. Pupillary reflexes
6. Applanation tonometry
7. Schiotz tonometry.
8. Measurement of accommodation and convergence
9. Visual acuity measurement.
10. Direct ophthalmoscopy
11. Indirect ophthalmoscopy
12. Retinoscopy
13. Light and dark adaptation.
14. Binocular vision(Stereopsis)

GEOMETRICAL OPTICS II:
SUB. CODE.2005
2hours/week- 2 credit

1) Vergence and vergence techniques revised.
2) Gullstrand's schematic eyes, visual acuity, Stile Crawford
3) Emmetropia and ametropia
4) Blur retinal Imaginary
5) Correction of spherical ammetropia, vertex distance and effective power, dioptric power of the spectacle, to calculate the dioptoric power, angular magnification of spectacles in aphakic
6) Thin lens model of the eye –angular magnification –spectacle and relative spectacle magnification.
7) Aperture stops- entrance and exit pupils.
8) Astigmatism. - To calculate the position of the line image in a sphero-cylindrical lens.
9) Accommodation –Accommodation formulae and calculations.
10) Presbyopia- Spectacle magnification, angular magnification of spectacle lens, near point,calculation of add, depth of field.
11) Spatial distribution of optical information- modulation transfer functions- Spatial filtering- applications.
12) Visual optics of aphakia and pseudophakia.

PRACTICAL: Total: 15 hours

1) Construction of a tabletop telescope – all three types of telescopes.
2) Construction of a tabletop microscope
3) Imaging by a cylindrical lens – relationship between cylinder axis and image orientation
4) Imaging by two cylinders in contact – determination of the position of CLC; verification of CLC using a spherical lens with power equal to the spherical equivalent; orientations and position of the line images and their relation to the cylinders' powers and orientations
5) Imaging by a spherocylindrical lens – sphere and cylinder in contact – determination of the position of CLC; verification of CLC using a spherical lens with power equal to the spherical equivalent; orientations and position of the line images and their relation to the cylinder's power and orientation.

PHYSICAL OPTICS-II
SUB. CODE.2006
2hours/week- 2 credit

No.	Topics
1	Nature of light –light as electromagnetic oscillation –wave equation; ideas of sinusoidal oscillations –simple harmonic oscillation; transverse nature of oscillation; concepts of frequency, wavelength, amplitude and phase.
2	Sources of light; Electromagnetic Spectrum.
3	Polarized light; linearly polarized light; and circularly polarized light.
4	Intensity of polarized light; Malus'Law; polarizers and analyzers; Methods of producing polarized light; Brewster's angle.
5	Birefringence; ordinary and extraordinary rays.
6	Relationship between amplitude and intensity.
7	Coherence; interference; constructive interference, destructive interference; fringes; fringe width.
8	Double slits, multiple slits, gratings.
9	Diffraction; diffraction by a circular aperture; Airy's disc
10	Resolution of an instrument (telescope, for example); Raleigh's criterion
11	Scattering; Raleigh's scattering; Tyndall effect.
12	Fluorescence and Phosphorescence
13	Basics of Lasers –coherence; population inversion; spontaneous emission; Einstein's theory of lasers.
14	Radiometry; solid angle; radiometric units; photopic and scotopic luminous efficiency and efficacy curves; photometric units
15	Inverse square law of photometry; Lambert's law.
16	Other units of light measurement; retinal illumination; Trolands

CLINICAL OPTOMETRY –II
SUB.CODE.: 2006
2hours/week- 2 credit

NOS.	SKILLS	DURATION	REMARKS
1.	• OPD SET UP • RERACTION ROOM • WARD SET UP • EQUIPMENTS • OPHTHALMIC DRUGS • RETINSCOPY	1MONTH	TO OBSERVE
2.	HISTORY TAKING	2MONTH	1/DAY
3.	TORCH LIGHT EXAMINATION OF EYE	3 MONTH	5/DAY
4.	VISION TAKING	4 MONTH	10/DAY

COMPUTERS SKILL
SUB. CODE.2007
1hours/week- 1 credit

1) Introduction to Excel: introduction, about worksheet, entering information, saving workbooks and formatting, printing the worksheet, creating graphs.
2) Introduction to power-point: introduction, creating and manipulating presentation, views, formatting and enhancing text, slide with graphs.
3) Introduction of Operating System: introduction, operating system concepts, types of operating system.
4) Computer networks: introduction, types of network (LAN, MAN, WAN, Internet, Internet), network topologies (star, ring, bus, mesh, tree, hybrid), components of network.
5) Internet and its Applications: definition, brief history, basic services (E-Mail, File Transfer Protocol, telnet, the World Wide Web (WWW)), www browsers, use of the internet.
6) Application of Computers in clinical settings.

SEMESTER III
OCULAR PATHOLOGY AND MICROBIOLOGY
SUB. CODE.3001
2hours/week- 2 credit

OCULAR MICROBIOLOGY

4hours/week- 4 credit

1) Morphology and principles of cultivating bacteria
2) Sterilization and disinfections used in laboratory and hospital practice
3) Common bacterial infections of the eye.
4) Common fungal infections of the eye
5) Common viral infections of the eye.
6) Common parasitic infections of the eye.

PATHOLOGY

1. Inflammation and repair
2. Infection in general
3. Specific infections
3.1 Tuberculosis
3.2 Leprosy
3.3 Syphilis
3.4 Fungal infection
3.5 Viral chlamydial infection
4. Neoplasia
5. Haematology
5.1 Anemia
5.2 Leukemia
5.3 Bleeding disorders
6. Circulatory disturbances
6.1 Thrombosis
6.2 Infarction
6.3 Embolism
7. Clinical pathology
7.1 Interpretation of urine report
7.2 Interpretation of blood smears.
8. Immune system
9. Shock, Anaphylaxis.
10. Allergy

PUBLIC HEALTH AND COMMUNITY OPTOMETRY
New Code: 3002
2 hours / week Credit : 2

1) Public Health Optometry: Concepts and implementation, Stages of diseases
2) Dimensions, determinants and indicators of health
3) Levels of disease prevention and levels of health care patterns
4)Epidemiology of blindness – Defining blindness and visual impairment
5) Eye in primary health care
6) Contrasting between Clinical and community health programs
7) Community Eye Care Programs
8)Community based rehabilitation programs
9) Nutritional Blindness with reference to Vitamin A deficiency
10) Vision 2020: The Right to Sight
11)Screening for eye diseases
12) National and International health agencies, NPCB
13) Role an optometrist in Public Health
14) Organization and Management of Eye Care Programs – Service Delivery models
15)Health manpower and planning & Health Economics
16)Evaluation and assessment of health programmes
17) Optometrist role in School and Health Programs
18) Basics of Tele Optometry and its application in Public Health
19) Information, Education and Communication for Eye Care programs

OPTOMETRIC OPTICS I
SUB. CODE.3003
2hours/week- 2 credit

2hours/week- 2 credit

COURSE PLAN (Total: 45 hours)
1. Introduction –Light, Mirror, Reflection, Refraction and Absorption
2. Prisms –Definition, properties, Refraction through prisms, Thickness difference, Base-apex notation, uses, nomenclature and units, Sign Conventions, Fresnel's prisms, rotary prisms
3. Lenses –Definition, units, terminology used to describe, form of lenses
4. Vertex distance and vertex power, Effectivity calculations
5. Lens shape, size and types i.e. Spherical, cylindrical and Sphero-cylindrical
6. Transpositions –Simple, Toric and Spherical equivalent
7. Prismatic effect, centration, decentration and Prentice rule, Prismatic effect of Plano-cylinder and Spherocylinderlenses
8. Spherometer & Sag formula, Edge thickness calculations
9. Magnification in high plus lenses, Minification in high minus lenses
10. Tilt induced power in spectacles
11. Aberration in Ophthalmic Lenses

VISUAL OPTICS I
SUB. CODE.3004
2hours/week- 2 credit

1. Review of Geometrical Optics: Vergence and power
1.1 Conjugacy, object space and image space
1.2 Sign convention
1.3 Spherical refracting surface
1.4 Spherical mirror; catoptric power
1.5 Cardinal points
1.6 Magnification
1.7 Light and visual function
1.8 Clinical Relevance of: Fluorescence, Interference, Diffraction, Polarization, Bi-refringence, Dichroism
1.9 Aberration and application Spherical and Chromatic.
2. Optics of Ocular Structure
2.1 Cornea and aqueous
2.2 Crystalline lens
2.3 Vitreous
2.4 Schematic and reduced eye
3. Measurements of Optical Constants of the Eye
3.1 Corneal curvature and thickness
3.2 Keratometry
3.3 Curvature of the lens and ophthalmophakometry
3.4 Axial and axis of the eye
3.5 Basic Aspects of Vision.
3.5.1 Visual Acuity
3.5.2 Light and Dark Adaptation
3.5.3 Color Vision
3.5.4 Spatial and Temporal Resolution
3.5.5 Science of Measuring visual performance and application to Clinical Optometry
4. Refractive anomalies and their causes
4.1 Etiology of refractive anomalies
4.2 Contributing variability and their ranges
4.3 Populating distributions of anomalies.
4.4 Optical component measurements
4.5 Growth of the eye in relation to refractive errors

OCULAR DISEASES I
SUB. CODE.3005
2hours/week- 2 credit

1. Orbit
1.1Applied Anatomy
1.2Proptosis (Classification, Causes, Investigations)
1.3Enophthalmos
1.4Developmental Anomalies (craniosynostosis, Craniofacial Dysostosis, Hypertelorism, Median facial cleft syndrome)
1.5 Orbital Inflammations (Preseptal cellulites, Orbital cellulitis Orbital Periostitis, cavernous sinus Thrombosis)
1.6 Grave's Ophthalmopathy
1.7 Orbital tumors(Dermoids, capillary haemangioma, Optic nerve glioma)
1.8 Orbital blowout fractures
1.9 Orbital surgery (Orbitotomy)
1.10 Orbital tumors
1.11 Orbital trauma
1.12 Approach to a patient with proptosis
2. Lids
2.1 Applied Anatomy
2.2 Congenital anomalies (Ptosis, Coloboma, Epicanthus, Distichiasis, Cryptophthalmos)
2.3 Oedema of the eyelids(Inflammatory, Solid, Passive edema)
2.4 Inflammatory disorders (Blepharitis, External Hordeolum, Chalazion ,Internalhordeolum, Molluscum Contagiosum)
2.5 Anomalies in the position of the lashes and Lid Margin (Trichiasis, Ectropion, Entropion, Symblepharon, Blepharophimosis, Lagophthalmos, Blepharospasm, Ptosis).
2.6 Tumors (Papillomas, Xanthelasma, Haemangioma, Basal carcinoma, Squamous cell carcinoma, sebaceous gland melanoma)
3. Lacrimal System
3.1 Applied Anatomy
3.2 Tear Film
3.3 The Dry Eye (Sjogren's Syndrome)
3.4 The watering eye (Etiology, clinical evaluation)
3.5 Dacryocystitis
3.6 Swelling of the Lacrimal gland(Dacryoadenitis)
4. Conjunctiva
4.1 Applied Anatomy
4.2 Inflammations of conjunctiva (Infective conjunctivitis – bacterial, chlamydial, viral , Allergic conjunctivitis, Granulomatous conjunctivitis)
4.3 Degenerative conditions(Pinguecula, Pterygium, Concretions)
4.4 Symptomatic conditions(Hyperaemia, Chemosis, Ecchymosis, Xerosis, Discoloration)
4.5 Cysts and Tumors
5. Cornea
5.1 Applied Anatomy and Physiology
5.2 Congenital Anomalies (Megalocornea, Microcornea, Cornea plana, Congenital cloudy cornea)
5.3 Inflammations of the cornea (Topographical classifications: Ulcerative keratitis and Non ulcerative
5.4 Etiological classifications: Infective, Allergic, Trophic, Traumatic, Idiopathic))
5.5 Degenerations (classifications, Arcussenilis, Vogt's white limbal girdle, Hassal-henle bodies, Lipoid Keratopathy, Band shaped keratopathy, Salzmann's nodular degeneration, Droplet keratopathy, Pellucid Marginal degeneration)

5.6 Dystrophies (Reis Buckler dystrophy,Recurrent corneal erosion syndrome, Granular dystrophy, Lattice dystrophy, Macular dystrophy, cornea guttata, Fuch's epithelial endothelial dystrophy, Congenital hereditary endothelial dystrophy)
5.7 Keratoconus, Keratoglobus
5.8 Corneal oedema, Corneal opacity, Corneal vascularisation
5.9 Penetrating Keratoplasty
6. Uveal Tract and Sclera
6.1 Applied Anatomy,
6.2 Classification of uveitis
6.3 Etiology
6.4 Pathology
6.5 Anterior Uveitis
6.6 Posterior Uveitis
6.7 Purulent Uveitis
6.8 Endophthalmitis
6.9 Panophthalmitis
6.10 Pars Planitis
6.11 Tumors of uveal tract(Melanoma)
6.12 Episcleritis and scleritis
6.13 Clinical examination of Uveitis and Scleritis

OPTOMETRIC INSTRUMENTATION
SUB. CODE.3006
2hours/week- 2 credit

1. Refractive instruments
1.1 Optotypes and MTF, Spatial Frequency
1.2 Test charts standards.
1.3 Choice of test charts
1.4 Trial case lenses
1.5 Refractor (phoropter) head units
1.6 Optical considerations of refractor units
1.7 Trial frame design
1.8 Near vision difficulties with units and trial frames
1.9 Retinoscope – types available
1.10 Adjustment of Retinoscopes- special features
1.11 Objective optometers.
1.12 Infrared optometer devices.
1.13 Projection charts
1.14 Illumination of the consulting room.
1.15 Brightness acuity test
1.16 Vision analyzer
1.17 Pupilometer
1.18 Potential Acuity Meter
1.19 Abberometer
2. Ophthalmoscopes and related devices
2.1 Design of ophthalmoscopes – illumination
2.2 Design of ophthalmoscopes- viewing
2.3 Ophthalmoscope disc

CLINICAL OPTOMETRY-III
SUB. CODE.3007
3 hours/week- 3 credit

NOS.	SKILLS	DURATION	REMARKS
1.	SUBJECTIVE REFRACTION	1 MONTH	4/DAY
2.	SAC SYRINGING IOP MEASUREMENT	2 MONTH	1/DAY 5/DAY
3.	AUTO REFRACTOMETER PERIMETER KERATOMETER ASCAN BIOMETER SLIT LAMP OPHTHALMOSCOPE	3 MONTH	OPERATING EQUIPMENT UNDER SUPERVISION
4.	SURGICAL PROCEDURE & FITTING OF CONTACT LENS	4 MONTH	ASSISTANT UNDER STRICT SUPERVISION

SEMESTER IV
CLINICAL PSYCHOLOGY
SUB. CODE.4001
2hours/week- 2 credit

Sr. No.	Topics	Total Hours
1	Introduction to Psychology	2
2	Intelligence Learning, Memory, Personality, Motiviation	2
3	Body Integrity – one's body image	2
4	The patient in his Milen	4
5	The self-concept of the therapist, Therapist-patient relationship – some guidelines	4
6	Illness, its impact on the patient	4
7	Maladies of the age and their impact on the patient's own and others concept of his body Image	4
8	Adapting changes in Vision	4
9	Why Medical Psychology demands commitment?	4
	Total	30Hours

EVS AND BIOMEDICAL WASTE
SUB. CODE.4002
2hours/week- 2 credit

ENVIRONMENTAL STUDIES

TOPICS /SUB-TOPIC
Introduction to Environment, terminologies, project and guidelines
Water and marine pollution
Multidisciplinary nature of environmental studies, public awareness
Renewable and non renewable resources, Air pollution , Noise Pollution, S.W.P.
Biodiversity and its conservation hot spot, value
Ecosystem structure, function energy flow, food chains of bio diversity.
Nuclear pollution and disaster management, value education
Unsustainable to SD, waste land reclamation.
Acts- environmental protection, air waste, foest, wild life control
Water conservation, watershed management, waste land reclamation
Global warming, Acid rain, Ozone depletion
Land reclamation, consumption and waste products
IT role, HIV/Aids
Human Population and the environment
Children and women welfare environmental ethics

BIOMEDICAL WASTE
1. What is waste, types of wastes and it's history
2. Segregation
3 Handling along with precaution and safety materials used
4. Disposal methods and techniques
5. Laws and waste management
6. Sites for disposal along with dumping grounds in Maharashtra state.
7. Processing of the dumping grounds
8. Universal precautions
9. Colour coding of disposal bags along with labelling
10. Instruments used for biomedical wastes disposal
11. Storage methods and precautions of biomedical waste at hospital level.
12. Risk to human health
13. How to reduce the medial wastes. Along with the 3Rs… reduce, reuse and recycle
14. Composting and it's benefits

OCULAR PHARMACOLOGY
SUB. CODE.4003
2hours/week- 2 credit

Sr No	Topics
1	General Pharmacology: Introduction & sources of drugs, Routes of drug administration, 10 Pharmacokinetics (emphasis on ocular pharmacokinetics), Pharmacodynamics & factors modifying drug actions
2	Systemic Pharmacology: Autonomic nervous system: Drugs affecting papillary size and 10 light reflex, Intraocular tension, Accommodation; Cardiovascular system: Anti-hypertensive sand drugs useful in Angina; Diuretics: Drugs used in ocular disorders; Central Nervous System: Alcohol, sedative hypnotics, General & local anaesthetics, Opioids & non-opioids; Chemotherapy : Introduction on general chemotherapy, Specific chemotherapy –Antiviral, antifungal, antibiotics; Hormones : Corticosteroids, Antidiabetics; Blood Coagulants
3	Ocular Pharmacology: Ocular preparations, formulations and requirements of an ideal 10 agent; Ocular Pharmacokinetics, methods of drug administration & Special drug delivery system; Ocular Toxicology
4	Diagnostic & Therapeutic applications of drugs used in Ophthalmology: Diagnostic 15 Drugs & biological agents used in ocular surgery, Anaesthetics used in ophthalmic procedures, Anti-glaucoma drugs; Pharmacotherapy of ocular infections –Bacterial, viral, fungal & chlamydial; Drugs used in allergic, inflammatory& degenerative conditions of the eye; Immune modulators in Ophthalmic practice, Wetting agents & tear substitutes ,Antioxidants

Visual Optics II
SUB. CODE.4004
2hours/week- 2 credit

Sr No	Topic
1	Accommodation & Presbyopia ➢ Far and near point of accommodation ➢ Range and amplitude of accommodation ➢ Mechanism of accommodation ➢ Variation of accommodation with age ➢ Anomalies of accommodation ➢ Presbyopia ➢ Hypermetropia and accommodation
2	Convergence: □ Type, Measurement and Anomalies □ Relationship between accommodation and convergence-AC/A ratio
3	Objective Refraction (Static & Dynamic) □ Streak retinoscopy □ Principle, Procedure, Difficulties and interpretation of findings □ Transposition and spherical equivalent □ Dynamic retinoscopy various methods □ Radical retinoscopy and near retinoscopy □ Cycloplegic refraction
4	Subjective Refraction: □ Principle and fogging □ Fixed astigmatic dial(Clock dial),Combination of fixed and rotator dial(Fan and block test),J.C.C □ Duochrome test o Binocular balancing- alternate occlusion, prism dissociation, dissociate Duochrome balance, Borish dissociated fogging o Binocular refraction-Various techniques
5	Effective Power &Magnification : □ Ocular refraction vs. Spectacle refraction □ Spectacle magnification vs. Relative spectacle magnification □ Axial vs. Refractive ammetropia, Knapp's law □ Ocular accommodation vs. Spectacle accommodation □ Retinal image blur-Depth of focus and depth of field

OCULAR DISEASE II
SUB. CODE.4005
2hours/week- 2 credit

Sr No	Topic
1	Retina and Vitreous: □ Applied Anatomy □ Congenital and Developmental Disorders (Optic Disc: Coloboma, Drusen, Hypoplasia, Medullated nerve fibers; Persistent Hyaloid Artery) □ Inflammatory disorders (Retinitis : Acute purulent , Bacterial, Virus, mycotic) □ Retinal Vasculitis (Eales's) □ Retinal Artery Occlusion (Central retinal Artery occlusion) □ Retinal Vein occlusion (Ischaemic, Non Ischaemic , Branch retinal vein occlusion) □ Retinal degenerations : Retinitis Pigmentosa, Lattice degenerations □ Macular disorders: Solar retinopathy, central serous retinopathy, cystoid macular edema, Age related macular degeneration. □ Retinal Detachement: Rhegmatogenous, Tractional, Exudative) □ Retinablastoma □ Diabetic retinopathy
2	Ocular Injuries: Terminology : Closed globe injury (contusion, lamellar laceration) Open 3 globe injury (rupture, laceration, penetrating injury, perforating injury) □ Mechanical injuries (Extraocular foreign body, blunt trauma, perforating injury, sympathetic ophthalmitis) □ Non Mechanical Injuries (Chemical injuries, Thermal, Electrical, Radiational) □ Clinical approach towards ocular injury patients
3	Lens • Applied Anatomy and Physiology • Clinical examination • Classification of cataract • Congenital and Developmental cataract • Acquired (Senile, Traumatic, Complicated, Metabolic, Electric, Radiational, Toxic) • Morphological: Capsular, Subcapsular, Cortical, Supranuclear, Nuclear, Polar. • Management of cataract (Non-surgical and surgical measures; preoperative • evaluation, Types of surgeries,) • Complications of cataract surgery • Displacement of lens: Subluxation, Displacement • Lens coloboma, Lenticonus, Microsperophakia.
4	Clinical Neuro-ophthalmology

DISPENSING OPTICS
SUB. CODE.4006
2hours/week- 2 credit

Sr No	Topic
1	Components of spectacle prescription & interpretation, transposition, Add and near power relation
2	Frame selection –based on spectacle prescription, professional requirements, age group, face shape
3	Measuring Inter-pupillary distance (IPD) for distance & near, bifocal height
4	Lens & Frame markings, Pupillary centers, bifocal heights, Progressive markings & adjustments –facial wrap, pantoscopic tilt
5	Recording and ordering of lenses (power, add, diameter, base, material, type, lens enhancements)
6	Neutralization –Hand &lensometer, axis marking, prism marking
7	Faults in spectacles (lens fitting, frame fitting, patients complaints, description, detection and correction)
8	Final checking & dispensing of spectacles to customers, counseling on wearing & maintaining of spectacles, Accessories –Bands, chains, boxes, slevets, cleaners, screwdriver kit
9	Spectacle repairs –tools, methods, soldering, riveting, frame adjustments
10	Special types of spectacle frames ➢Monocles ➢Ptosis crutches ➢Industrial safety glasses ➢Welding glasses
11	Frame availability in Indian market
12	FAQ's by customers and their ideal answers

Clinical Optometry-IV
SUB. CODE.4007
3 hours/week- 3 credit

Student will gain additional skills in clinical procedures, interaction with patients and professional personnel. Students apply knowledge from previous clinical learning experience under the supervision of a registered optometrist. Students are tested on intermediate clinical optometry skills. The practical apsects of the dispensing optics (hand – on in optical) optometric instruments, clinical examination if visual system (hands –on under supervision) and case discussion) will be given to the students during their clinical training.

SEMESTER V

PRACTICE MANAGEMENT
SUB. CODE.5001
2 hours/week- 2 credit

1. Business Management:
1.1 Practice establishment and development
1.2 Stock control and costing
1.3 Staffing and staff relations
1.4 Business computerization
2. Accounting Principles
2.1 Sources of finance
2.2 Bookkeeping and cash flow
3. Taxation and taxation planning
4. Professionalism and Values
4.1 Professional values- Integrity, Objectivity, Professional competence and due care, Confidentiality
4.2 Personal values- ethical or moral values
4.3 Attitude and behaviour- professional behaviour, treating people equally
4.4 Code of conduct , professional accountability and responsibility, misconduct
4.5 Differences between professions and importance of team efforts
4.6 Cultural issues in the healthcare environment

CONTACT LENSES I
SUB. CODE.5002
2 hours/week- 2 credit

1. Introduction to Contact lenses
1.1 Definition
1.2 Classification / Types
2. History of Contact Lenses
3. Optics of Contact Lenses
3.1 Magnification & Visual field
3.2 Accommodation & Convergence
3.3 Back & Front Vertex Power / Vertex distance calculation
4. Review of Anatomy & Physiology of
4.1 Tear film
4.2 Cornea
4.3 Lids & Conjunctiva
5. Introduction to CL materials
5.1 Monomers, Polymers
6. Properties of CL materials
6.1 Physiological (Dk, Ionicity, Water content)
6.2 Physical (Elasticity, Tensile strength, Rigidity)
6.3 Optical (Transmission, Refractive index)
7. Indications and contraindications
8. Parameters / Designs of Contact Lenses & Terminology
9. RGP Contact Lens materials
10. Manufacturing Rigid and Soft Contact Lenses – various methods
11. Pre-Fitting examination – steps, significance, recording of results
12. Correction of Astigmatism with RGP lens
13. Types of fit – Steep, Flat, Optimum – on spherical cornea with spherical lenses
14. Types of fit – Steep, Flat, Optimum – on Toric cornea with spherical lenses
15. Calculation and finalising Contact lens parameters
16. Ordering Rigid Contact Lenses – writing a prescription to the Laboratory
17. Checking and verifying Contact lenses from Laboratory
18. Modifications possible with Rigid lenses
19. Common Handling Instructions
19.1 Insertion & Removal Techniques
19.2 Do's and Dont's
20. Care and Maintenance of Rigid lenses
20.1 Cleaning agents & Importance
20.2 Rinsing agents & Importance
20.3 Disinfecting agents & importance
20.4 Lubricating & Enzymatic cleaners
21. Follow up visit examination
22. Complications of RGP lenses

PRACTICAL

1. Measurement of Ocular dimensions
2. Pupillary diameter and lid characteristics
3. Blink rate and TBUT
4. Schrimers test, Slit lamp examination of tear layer
5. Keratometry
6. Placido's disc
7. Soft Contact Lens fitting – Aspherical
8. Soft Contact Lens fitting – Lathecut lenses
9. Soft Contact Lens over refraction
10. Lens insertion and removal
11. Lens handling and cleaning
12. Examination of old soft Lens
13. RGP Lens fitting
14. RGP Lens Fit Assessment and fluorescein pattern
15. Special RGP fitting (Aphakia, pseudo phakia & Keratoconus)
16. RGP over refraction and Lens flexure
17. Examination of old RGP Lens
18. RGP Lens parameters
19. Slit lamp examination of Contact Lens wearers

LOW VISION
SUB. CODE.5003
2hours/week- 2 credit

1) Definitions & classification of Low vision
2) Epidemiology of low vision
3) Model of low vision service
4) Pre-clinical evaluation of low vision patients – prognostic & psychological factors; psycho-social impact of low vision
5) Types of low vision aids – optical aids, non-optical aids & electronic devices
6) Optics of low vision aids

PAEDIATRIC OPTOMETRY
SUB. CODE.5004
2hours/week- 2 credit

1. The Development of Eye and Vision
2. History taking Paediatric subjects
3. Assessment of visual acuity
4. Normal appearance, pathology and structural anomalies of
   4.1 Orbit, Eye lids, Lacrimal system,
   4.2 Conjunctiva, Cornea, Sclera Anterior chamber, Uveal tract, Pupil
   4.3 Lens, vitreous, Fundus Oculomotor system
5. Refractive Examination
6. Determining binocular status

BINOCULAR VISION
SUB. CODE.5005
2hours/week- 2 credit

1. Binocular Vision and Space perception.
1.1 Relative subjective visual direction.
1.2 Retino motor value
1.3 Grades of BSV
1.4 SMP and Cyclopean Eye
1.5 Correspondence,
1.6 Fusion, Diplopia, Retinal rivalry
1.7 Horopter
1.8 Physiological Diplopia and Suppression
1.9 Stereopsis, Panum's area, BSV.
1.10 Stereopsis and monocular clues - significance.
1.11 Egocentric location, clinical applications.
1.12 Theories of Binocular vision.
2.Anatomy of Extra Ocular Muscles.
2.1 Rectii and Obliques, LPS.
2.2 Innervation & Blood Supply
3.Physiology of Ocular movements.
3.1 Center of rotation, Axes of Fick.
3.2 Action of individual muscle.
4.Laws of ocular motility
4.1 Donder's and Listing's law
4.2 Sherrington's law
4.3 Hering's law
5.Uniocular& Binocular movements - fixation, saccadic & pursuits.
5.1 Version &Vergence.
5.2 Fixation & field of fixation
6.Near Vision Complex Accommodation
6.1 Definition and mechanism (process).
6.Methods of measurement.
6.3 Stimulus and innervation.
6.4 Types of accommodation.
6.5 Anomalies of accommodation – aetiology and management.
7.Convergence
7.1 Definition and mechanism.
7.2 Methods of measurement.
7.3 Types and components of convergence - Tonic, accommodative, fusional, proximal.
7.4 Anomalies of Convergence – aetiology and management.
8.Sensory adaptations
8.1 Confusion
9.Suppression
9.1 Investigations
9.2 Management
9.3 Blind spot syndrome
10Abnormal Retinal Correspondence
10.1 Investigation and management
10.2 Blind spot syndrome
11.Eccentric Fixation
11.1 Investigation and management
12.Amblyopia
12.1 Classsification
12.2 Aeitiology
12.3 Investigation
12.4 Management

SYSTEMIC DISEASES
SUB. CODE.5006
2hours/week- 2 credit

1. Hypertension
    1.1 Definition, classification, Epidemiology, clinical examination, complications, and management.
    1.2 Hypertensive retinopathy
2. Diabetes Mellitus
    2.1 Classification, pathophysiology, clinical presentations, diagnosis, and management, Complications
    2.2 Diabetic Retinopathy
3. Thyroid Disease
    3.1 Physiology, testing for thyroid disease, Hyperthyroidism, Hypothroidism, Thyroiditis, Thyroid tumors
    3.2 Grave's Ophthalmopathy
4. Acquired Heart Disease
    4.1 Ischemic Heart Disease, Congestive heart failure, Disorders of cardiac rhythm
    4.2 Ophthalmic considerations
5. Cancer :
    5.1 Incidence
    5.2 Etiology
    5.3 Therapy
    5.4 Ophthalmologic considerations
6. Connective Tissue Disease
    6.1 Rheumatic arthritis
    6.2 Systemic lupus erythematosus
    6.3 Scleroderma
    6.4 Polymyositis and dermatomyositis
    6.5 Sjogren syndrome
    6.6 Behcet's syndrome
    6.7 Eye and connective tissue disease
7.Tuberculosis
    7.1 Aetiology, pathology, clinical features, pulmonary tuberculosis, diagnosis, complications, treatment tuberculosis and the eye.
8.Herpes virus (Herepes simplex, Varicella Zoster, Cytomegalovirus, Epstein Barr Virus)
    8.1 Herpes and the eye

CLINICAL OPTOMETRY-V
SUB. CODE.5007
3hours/week- 3 credit

Gonioscopy 5 cases (Normals) slides of abnormal angels posting in optometry clinics 5+5+5+5+10 cases Pediatric/ contact lens/ Low vision / Orthoptics/GOPD camps 4 camps school screening, cataract IDO (on each other)10 cases (Normals) Slides of abnormal fundus case Analysis 5+5+5+5 cases Pathology Binocular Vision Clinical Refraction Dispensing Optics

SEMESTER VI

LAW AND OPTOMETRY
SUB. CODE.6001

2hours/week- 2 credit

1) Medical ethics - Definition - Goal - Scope b
2) Introduction to Code of conduct
3) Basic principles of medical ethics –Confidentiality
4) Malpractice and negligence - Rational and irrational drug therapy
5) Autonomy and informed consent - Right of patients
6) Care of the terminally ill- Euthanasia
7) Organ transplantation
8) Medico legal aspects of medical records –Medico legal case and type- Records and document related to MLC - ownership of medical records - Confidentiality Privilege communication - Release of medical information - Unauthorized disclosure - retention of medical records - other various aspects.
9) Professional Indemnity insurance policy
10) Development of standardized protocol to avoid near miss or sentinel events
11) Obtaining an informed consent.

ENTREPRENEURSHIP
SUB. CODE.6002
2hours/week- 2 credit

Objectives : The students will be able to understand Entrepreneurial spirit and resourcefulness, learn the concept and process of entrepreneurship - its contribution in and role in the growth and development of individual and the nation, strive for entrepreneurial quality, competency and motivation, learn the process and skills of creation and management of entrepreneurial venture.

Course Content

MODULE I:- Entrepreneurship: What, Why and How15 Hours
Entrepreneurship – Concept, Functions, Need, Importance, Myths about Entrepreneurship, Pros and Cons of Entrepreneurship, Process of Entrepreneurship

MODULE II:- An Entrepreneur15 Hours
Types of Entrepreneurs, Competencies and Characteristics, Ethical Entrepreneurship, Entrepreneurial Value – Values, Attitudes, Motivational, Mindset of an Employee and an Entrepreneur, Intrapreneur, Importance in Any Organization

MODULE III:- Entrepreneurship Journey15 Hours
Self-Assessment of qualities, skills, resources, dreams, Generation of ideas, Feasibility studies, Opportunity assessments, Business Plan Preparation, Execution of Business Plan, Role of Society and Family in the growth of an entrepreneur, Challenges faced by women in Entrepreneurship

MODULE IV:- Entrepreneurship as innovation and problem solving15 Hours
Entrepreneurs - as problem solvers, Innovations and Entrepreneurial Ventures, Social Entrepreneurship- Concept & importance, Risk Taking- Concept, Type of business risk, The role of technology/ social media in creating new forms of – Firms, Network, Organisation, Network, cooperative clusters, Barriers to Entrepreneurship, Support structure for promoting entrepreneurship- various government schemes

RESEARCH AND BIOSTATICS
SUB. CODE.6003
2hours/week- 2 credit

Research Methodology
1. Introduction to research methods
2. Identifying research problem
3. Ethical issues in research
4. Research design
5. Types of Data
6. Research tools and Data collection methods
7. Sampling methods
8. Developing a research proposal
Biostatistics
1. Basics of Biostatistics
1.1 Introduction of Biostatistics
1.2 Measures of Morality
1.3 Sampling
1.4 Statistical significance
1.5 Correlation
1.6 Sample size determination.
1.7 Statistics –Collection of Data - presentation including classification and diagrammatic representation –frequency distribution. Measures of central tendency; measures of dispersion.
1.8 Theoretical distributions.
1.8.1 Binomial
1.8.2 Normal
1.8.3 Sampling –necessity of methods and techniques.
1.8.4 Chi. Square test (2 x 2)
2. Hospital Statistics
3. Use of computerized software for statistics

CONTACT LENS-II
SUB. CODE.6004
2hours/week- 2 credit

1.SCL Materials & Review of manufacturing techniques
2.Comparison of RGP vs. SCL
3.Pre-fitting considerations for SCL
4.Fitting philosophies for SCL
5.Fit assessment in Soft Contact Lenses: Types of fit – Steep, Flat, Optimum
6.Calculation and finalising SCL parameters
6.1 Disposable lenses
6.2 Advantages and availability
7. Soft Toric CL
7.1 Stabilization techniques
7.2 Parameter selection
7.3 Fitting assessment
8. Common Handling Instructions
8.1 Insertion & Removal Techniques
8.2 Do's and Dont's
9. Care and Maintenance of Soft lenses
9.1 Cleaning agents & Importance
9.2 Rinsing agents & Importance
9.3 Disinfecting agents & importance
9.4 Lubricating & Enzymatic cleaners
10. Follow up visit examination
11. Complications of Soft lenses
12. Therapeutic contact lenses
12.1 Indications
12.2 Fitting consideration
13. Specialty fitting
13.1 Aphakia
13.2 Pediatric
13.3 Post refractive surgery
14. Management of Presbyopia with Contact lenses

PRACTICAL

1) Examination of old soft Lens
2) RGP Lens fitting
3) RGP Lens Fit Assessment and fluroscein pattern
4) Special RGP fitting (Aphakia, pseudo phakia&Keratoconus)
5) RGP over refraction and Lens flexure
6) Examination of old RGP Lens
7) RGP Lens parameters
8) Fitting Cosmetic Contact Lens
9) Slit lamp examination of Contact Lens wearers
10) Fitting Toric Contact Lens
11) Bandage Contact Lens
12) SPM &Pachymetry at SN During Clinics
13) Specialty Contact Lens fitting

HOSPITAL ORGANISATION
SUB. CODE.6005
2hours/week- 2 credit

1 ORGANISATION OF CLINICAL SERVICES

a) EMERGENCY (CASUALITY)
b) OPD
c) IPD
d) LABORATORY
e) BLOOD BANK
f) IMAGING
g) OPERATION THEATRE
h) ICU AND MATERNITY ETC

2. ORGANISATION OF SUPPORTIVE SERVICES

a) CSSD
b) DIETARY
c) MEDICAL GASES
d) MEDICAL RECORD
e) REHABILATATION
f) HOUSE KEEPING
g) SAFETY AND SECURTY
h) LAUNDARY
i) OCCUPATIONAL HEALTH SERVICES
j) PHARMACY
k) AMBULANCE SERVICES

3. ORGANISATION OF ADMINSTRATIVE SERVICES
a) FRONT OFFICE
b) ADMISSION
c) BILLING
d) PATIENTS AND TPA ACCOUNTS
e) TIME KEEPING
f) DISASTER MANAGEMENT
g) EFFECTIVE UTILISATION OF HOSPITAL BEDS AND SERVICES
h) ACADEMIC AND RESEARCH ACTIVITY

GERIATIC OPTOMETRY
SUB. CODE.6006
2hours/week- 2 credit

1. Structural , and morphological changes of eye in elderly
2. Physiological changes in eye in the course of aging.
3. Introduction to geriatric medicine – epidemiology , need for optometry care, systemic diseases (Hypertension, Atherosclerosis, coronary heart disease, congestive Heart failure, Cerebrovascular disease, Diabetes, COPD)
4. Optometric Examination of the Older Adult
5. Ocular diseases common in old eye, with special reference to cataract, glaucoma, macular disorders, vascular diseases of the eye
6. Contact lenses in elderly
7. Pharmacological aspects of aging
8. Low vision causes, management and rehabilitation in geriatrics.
9. Spectacle dispensing in elderly – Considerations of spectacle lenses and frames

CLINICAL OPTOMETRY VI
SUB. CODE.6007
3 hours / week
3 credits

The course provides students the opportunity to continue to develop confidence and increased skill in diagnosis and treatment delivery. Students will demonstrate competence in basic, intermediate and advance procedure in those areas. Students will participate in advance and specialized diagnostic and management procedure. Students will get practical experience of the knowledge acquired from geriatric and paediatric optometry courses. Hands-on experience under supervision will be provided in various outreach programmes namely, school vision screening, glaucoma and diabetic retinopathy screening etc., Students also get hand-on practical sessions on the following courses namely, contact lens, low vision care, geriatric optometry and paediatric optometry.

SEMESTER 7&8

CLINICAL INTERNSHIP

General OPD (History taking –DO)
500 cases
Weekly 1 case report submission

Contact Lens
20 cases (5 RGP+ 5 Soft + 5 toric)
Totally 3 different case reports submission at the end of the postings

Opticals
100 cases
Weekly 1 case report submission

Low Vision care Clinic
10 cases
Totally 3 different case reports submission at the end of the postings

Binocular Vision clinic
10 cases
Totally 3 different case reports submission at the end of the postings

Ophthalmology clinic (Common eye conditions)
50 cases
Totally 3 different case reports submission at the end of the postings

Camps
10 camps
Camp report
submission

Choice of Electives in the programs

Electives: The choice of electives and option to choose specialties like eye banking , ocular prosthesis , ocular imaging, electrophysiology , vision therapy , refractive surgery etc. will be time to time added as per the changing trends.

Curriculum

Level 4	Code	Educational Component	Credit	Marks
Semester I		**Theory**		
	1001	GENERAL ANATOMY	2	50
	1002	GENERAL PHYSIOLOGY	2	50
	1003	ENGLISH & COMMUNICATION	2	50
	1004	GEOMETRICAL OPTICS -I	2	50
	1005	PHYSICAL OPTICS -I	2	50
	1006	OCULARANATOMY	2	50
	1007	CLINICAL OPTOMETRY – I (PR)	2	50
	1008	COMPUTER SKILLS (PR)	1	25
On-Job- Training (OJT)/Qualification Packs			15	375

Level 5	Code	Educational Component	Credit	Marks
Semester II	2001	MATHEMATICS	2	50
	2002	PERSONALITY DEVELOPMENT	2	50
	2003	GENERAL BIOCHEMISTRY	2	50
	2004	OCULAR PHTSIOLOGY	2	50
	2005	GEOMETRICAL OPTICS-II	2	50
	2006	PHYSICAL OPTICS-II	2	50
	2007	CLINICAL OPTOMETRY – I (PR)	2	50
	2008	COMPUTER SKILLS (PR)	1	25
On-Job- Training (OJT)/Qualification Packs			15	375

Level 6	Code	Educational Component	Credit	Marks
Semester III	3001	OCULAR PATHOLOGY & MICROBIOLOGY	2	50
	3002	PUBLIC HEALTH AND COMMUNITY OPTOMETRY	2	50
	3003	OPTOMETRY OPTICS	2	50
	3004	VISUAL OPTICS-I	2	50
	3005	OCULAR DISEASES-I	2	50
	3006	CLINICAL OPTOMETRY –III (PR)	3	75
	3007	OPTOMETRIC INSTRUMENTATION(PR)	2	50
On-Job- Training (OJT)/Qualification Packs			15	375

Level 6	Code	Educational Component	Credit	Marks
Semester IV	4001	CLINICAL PSYCHOLOGY	2	50
	4002	EVS & BIOMEDICAL WASTE	2	50
	4003	OCULAR PHARMACOLOGY	2	50
	4004	VISUAL OPTICS-II	2	50
	4005	OCULAR DISEASES-II	2	50
	4006	CLINICAL OPTOMETRY –IV (PR)	3	50
	4007	DISPENSING OPTICS (PR)	2	50
On-Job- Training (OJT)/Qualification Packs			15	375

Level 7	Code	Educational Component	Credit	Marks
Semester V	5001	PRACTICE MANAGEMENT	2	25
	5002	CONTACT LENS – I	2	50
	5003	LOW VISION	2	50
	5004	PEDIATRIC OPTOMETRY	2	50
	5005	BINOCULAR VISION	2	25
	5006	SYSTEMIC DISEASES	2	25
	5007	CLINICAL OPTOMETRY –V	3	50
On-Job- Training (OJT)/Qualification Packs			15	375

Level 7	Code	Educational Component	Credit	Marks
Semester VI	6001	LAW AND OPTOMETRY	2	25
	6002	ENTREPRENEURSHIP	2	50
	6003	RESEARCH & BIOSTATICS	2	50
	6004	CONTACT LENS – II	2	50
	6005	HOSPITAL ORGANISATION	2	25
	6006	GERIATIC OPTOMETRY GERIATRIC	2	25
	6007	CLINICAL OPTOMETRY –VI	3	50
On-Job- Training (OJT)/Qualification Packs			15	375

Level 8	Code	Educational Component	Credit	Marks
Semester VII	7001	RESEARCH PROJECT	12	300
	7002	INTERNSHIP	3	75
On-Job- Training (OJT)/Qualification Packs			15	375

Level 8	Code	Educational Component	Credit	Marks
Semester VIII	8001	RESEARCH PROJECT	12	300
	8002	INTERNSHIP	3	75
On-Job- Training (OJT)/Qualification Packs			15	375

Note : *Qualification packs not available , to be prepared and submitted to NSDA for approval.