



# MGM INSTITUTE OF HEALTH SCIENCES

(Deemed to be University u/s 3 of UGC Act, 1956)

**Grade 'A' Accredited by NAAC**

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**CHOICE BASED CREDIT SYSTEM**

**(CBCS)**

**(with effect from 2017-18 Batches)**

**Curriculum for**

**B.Optomety**

Amended upto BOM 63/2021, Dated 17/02/2021

## **Amended History**

1. Approved as per BOM -55/2018 [Resolution No.4.4.1.6], Dated 27/11/2018
2. As Amended in BOM-53/2018 [Resolution No.4.5.1.], Dated 19/05/2018
3. As Amended in BOM-55/2018 [Resolution No.4.13], Dated 27/11/2018
4. As Amended in BOM-57/2019 [Resolution No.3.2.16.e], Dated 26/04/2019
5. As Amended in BOM-57/2019 [Resolution No.3.2.16.f], Dated 26/04/2019
6. As Amended in BOM- 63/202 [Resolution No. 4.3.1.6, Dated 17/02/2021

**CURRICULUM FOR B.OPTOMETRY**  
**First Year**

**Semester I**

Syllabus Ref. No.	Subject	Credits	Teaching hours	Marks		
				Internal Assessment	Semester Exam	Total
<b>Core Subjects</b>						
BOPT 101 T	General Anatomy & General Physiology	3	3	20	80	100
BOPT 102 T	Physical Optics	3	3	20	80	100
BOPT 103 T	General Biochemistry	3	3	20	80	100
BOPT 104	Nutrition (Multidisciplinary/Interdisciplinary)	3	3	20	80	100
<b>Practical</b>						
BOPT 105 P	General Anatomy & General Physiology	2	4	-	-	-
BOPT 106 P	Physical Optics	1.5	3	-	-	-
BOPT 107 P	General Biochemistry	1.5	3	-	-	-
<b>General Subject</b>						
BOPT 108	English&Communication skills	4	4	100	-	100
<b>Total</b>		<b>21</b>	<b>26</b>	<b>180</b>	<b>320</b>	<b>500</b>

**Semester II**

Syllabus Ref. No.	Subject	Credits	Teaching hours	Marks		
				Internal Assessment	Semester Exam	Total
<b>Core Subjects</b>						
BOPT 209 T	Ocular Anatomy & Physiology	3	3	20	80	100
BOPT 210 T	Geometrical Optics I & II	3	3	20	80	100
BOPT 211 T	Ocular Biochemistry	3	3	20	80	100
BOPT 212 T	Microbiology & Pathology	3	3	20	80	100
<b>Practical</b>						
BOPT 213 P	Ocular Anatomy & Physiology	2	4	-	-	-
BOPT 214 P	Geometrical Optics I & II	2	4	-	-	-
BOPT 215 P	Ocular Biochemistry	1.5	3	-	-	-
BOPT 216 P	Microbiology & Pathology (Multidisciplinary/Interdisciplinary)	1.5	3	-	-	-
<b>General Subject</b>						
BOPT 217	Bioethics & IPR	4	4	100		100
<b>Total</b>		<b>23</b>	<b>30</b>	<b>180</b>	<b>320</b>	<b>500</b>

**Second Year**

**Semester III**

Syllabus Ref. No.	Subject	Credits	Teaching hours	Marks		
				Internal Assessment	Semester Exam	Total
<b>Core Subjects</b>						
BOPT 318 T	Physical Optics	3	3	20	80	100
BOPT 319 T	Geometrical Optics	3	3	20	80	100
BOPT 320 T	Visual Optics I/II	4	4	20	80	100
BOPT 321 T	Ocular diseases I	4	4	20	80	100
BOPT 322 T	Clinical Examinations and Visual systems	2	2	50	-	50
<b>Practical</b>						
BOPT 323 P	Physical Optics	2	4	10	40	50
BOPT 324 P	Geometrical Optics	2	4	50	-	50
BOPT 325 P	Visual Optics I/II	2	4	50	-	50
BOPT 326 P	Clinical Examinations and Visual systems	2	4	10	40	50
<b>Generic Elective Course</b>						
GEC 001 T	Pursuit of Inner Self Excellence (POIS)	3	3	100	-	100
GEC 002 T	Organizational Behaviour					
<b>Total</b>		<b>27</b>	<b>35</b>	<b>350</b>	<b>400</b>	<b>750</b>

**Semester IV**

Syllabus Ref. No.	Subject	Credits	Teaching hours	Marks		
				Internal Assessment	Semester Exam	Total
<b>Core Subjects</b>						
BOPT 427 T	Optometric Optics I & II	4	4	20	80	100
BOPT 428 T	Ocular Diseases II & Glaucoma	4	4	20	80	100
BOPT 429 T	Dispensing Optics	4	4	20	80	100
BOPT 430 T	Optometric Instrumentation	3	3	20	80	100
BOPT 431 T	Basics & Ocular Pharmacology	2	2	20	80	100
<b>Practical</b>						
BOPT 432 P	Optometric Optics I & II	3	6	10	40	50
BOPT 433 P	Dispensing Optics	3	6	10	40	50
BOPT 434 P	Optometric Instrumentation	1	2	-	-	-
<b>Ability Enhancement Course</b>						
AEC 003 T	Computers and applications	3	3	100	-	100
AEC 004 T	Biostatistics and Research Methodology					
<b>Total</b>		<b>27</b>	<b>34</b>	<b>220</b>	<b>480</b>	<b>700</b>

### Third Year

Semester V						
Syllabus Ref. No.	Subject	Credits	Teaching hours	Marks		
Core Subjects				Internal Assessment	Semester Exam	Total
BOPT 535 T	Contact Lenses I	3	3	20	80	100
BOPT 536 T	Binocular Vision I&II	4	4	20	80	100
BOPT 537 T	Low Vision Aids	2	2	20	80	100
BOPT 538 T	Systemic Disease	3	3	20	80	100
BOPT 539 CP	BOPT Directed Clinical Education-II	9	27	50	-	50
Practical						
BOPT 540 P	Contact Lenses I	1	2	10	40	50
BOPT 541 P	Binocular Vision I&II	1	2	50	-	50
Core Elective Course						
CEC 005 T	Basics of Clinical Skills Learning	3	3	100	-	100
CEC 006 T	Hospital Operation Management					
<b>Total</b>		<b>26</b>	<b>46</b>	<b>290</b>	<b>360</b>	<b>650</b>

Semester VI						
Syllabus Ref. No.	Subject	Credits	Teaching hours	Marks		
Core Subjects				Internal Assessment	Semester Exam	Total
BOPT642 T	Contact Lenses II	2	2	20	80	100
BOPT643 T	Sports Vision	2	2	20	80	100
BOPT644 T	Pediatric and Geriatric Optometry	2	2	20	80	100
BOPT645 T	Occupational Optometry	2	2	20	80	100
BOPT 646 CP	BOPT Directed Clinical Education-III	12	36	50	-	50
Practical						
BOPT647 P	Contact Lenses II	1	2	10	40	50
BOPT648 P	Pediatric and Geriatric Optometry	1	2	10	40	50
<b>Total</b>		<b>22</b>	<b>48</b>	<b>150</b>	<b>400</b>	<b>550</b>

## Exam Pattern

### University Theory Exam pattern

Question type	No. of questions	Questions to be answered	Question X marks	Total marks
Long essays	3	2	2x15	30 marks
Short answers	7	5	5 x 10	50 marks
				<b>Total= 80 marks</b>

### Internal Exam pattern Theory

Question type	No. of questions	Questions to be answered	Question X marks	Total marks
Long essays	3	2	2x10	20 marks
Short answers	5	4	5x4	20 marks
<b>Total</b>				<b>Total= 40 marks</b>

Note: 40 marks to be converted to 20 marks

This should be submitted by respective departments at least 15 days prior to university exam to the Exam section.

# SEMESTER I

<b>Code No.</b>	<b>Core Subjects</b>
BOPT 101 T	General Anatomy & General Physiology
BOPT 102 T	Physical Optics
BOPT 103 T	General Biochemistry
BOPT 104	Nutrition (Multidisciplinary/Interdisciplinary)
<b>Practical</b>	
BOPT 105 P	General Anatomy & General Physiology
BOPT 106 P	Physical Optics
BOPT 107 P	General Biochemistry
<b>Generic Subject</b>	
BOPT 108	English & Communication skills

## SEMESTER I

**BOPT 101T- General Anatomy & General Physiology Theory(No. of lecture hrs assigned: 45 hrs)**

Paper	Topics
1	<p><b>Section A –</b></p> <p><b>General Anatomy (1hour each)</b> - Introduction to anatomy, Anatomical Terminology, Cell and Cell division, Tissues of body I-Epithelium, Tissues of body II-Connective tissue, Tissues of body III-Bone and cartilage, Bone I-Classification, Bone II- Blood supply, Parts of growing bone, ossification, Joints I-Classification, Joints II-Synovial joint, Muscle I-Introduction, Muscle II-Classification, Blood vessels, Lymphatic system, Glands, Skin and Facia, Over view of Respiratory System, Cardiovascular system I- Heart and Pericardium, Cardiovascular system II- Blood supply of heart, Over view of GIT I, Over view of GIT II, Over view of GIT III, Over view of Male reproductive System, Over view of Female reproductive System, Endocrine I- Pituitary Gland, Endocrine II- Thyroid Gland, Endocrine III- Suprarenal Gland, Nervous system I- Introduction to nervous system, Nervous system II- Cranial nerves-I to VI, Nervous system II- Cranial nerves-VII to XII.</p> <p><b>Section B –</b></p> <p><b>Physiology - CELL STRUCTURE AND ORGANIZATION (2hrs)</b>- General principals of cell physiology, Homeostasis, Physiology of skeletal muscle, <b>BLOOD (9 hrs)</b>- Composition &amp; functions of blood, Plasma proteins, Red blood cells- development, morphology and measurements- functions and dysfunctions, White blood cells- development, -classification, morphology and measurements- functions and dysfunctions, Platelets - development, morphology - functions and dysfunctions, hemostasis, Coagulation &amp; anticoagulants, Blood groups – classification, transfusion, Immunity, Reticulo-endothelial system: spleen, thymus, immune system, lymphatic tissue, and bone marrow, cellular, Humoral and autoimmune, <b>GIT(3 hrs)</b>- Overview of GIT, secretions: Pancreatic, Intestinal, Liver and bile, Motility: Deglutition, Gastric, Intestinal, vomiting and defecation, Digestion &amp; absorption of food, <b>RENAL SYSTEM(2 hrs)</b> - Body fluids- distribution, measurement and exchange, Kidney structure: Structure of nephron, mechanism of urine formations- composition of the urine and abnormal constituents- urinary bladder and Micturation, <b>ENDOCRINES(6 hrs)</b> - Hormone mechanism- negative feed backs- tropic action, Permissive action –cellular action, Hypothalamic regulation, Ant: &amp; Post pituitary: hormones, actions, and regulations, disorders, Thyroid: hormones, actions, and regulations, disorders, Adrenal cortex: hormones, actions, and regulations, disorders, Parathyroid: hormones, actions, and regulations, disorders, Islets of pancreas: hormones, actions, and regulations, disorders, <b>REPRODUCTION(2 hrs)</b> - Male reproduction system – control and regulation –semen analysis, Female reproduction system- uterus- ovaries – menstrual cycle – regulation pregnancy and delivery –breast –family planning, <b>RESPIRATION(2 hrs)</b>- Mechanics of respiration- pulmonary function tests, Transport of respiratory gases, Neural and chemical regulation of respiration –hypoxia, cyanosis, dyspnoea-asphyxia, <b>CVS (6 hrs)</b>- Heart: myocardium structure, function ,innervations, Transmission of cardiac impulse, Cardiac cycle, Cardiac output, Blood pressure: measurement, factors regulating, variations, Capillary circulation- venous circulations. Special circulation: coronary cerebral –miscellaneous, <b>ENVIRONMENTAL PHYSIOLOGY(2 hrs)</b> - Body temperature regulation (including skin physiology), Exposure to low and high atmospheric pressures</p>



**Text books (Anatomy):**

1. Mariano S.H. Difiore: Atlas of Human Histology, 5<sup>th</sup> Ed. 1981, Lea and Feliger.
2. G.J. Tortora & N.P Anagnostakos: Principles of Anatomy and Physiology.
3. B.D. Chaurasia: Handbook of General Anatomy, 2<sup>nd</sup> Ed.

**Reference books (Anatomy):**

1. Peter L. Williams And Roger Warwick:- Gray's Anatomy - Descriptive and Applied, 36<sup>th</sup> Ed., 1980, Churchill Livingstone.
2. T.S. Ranganathan : Text book of Human Anatomy, 1982, S. Chand & Co., NewDelhi 110 055.
3. Inderbirsingh : Human Embryology, 3rd Ed., Macmillan India, 1981.
4. R. Kanagasuntharam, P. Sivananda-Singham & A. Krishnamurti: Anatomy- Regional, Functional, & Clinical, P.G. Publisher, Singapore 1987.

**Text Book (Physiology):**

1. L Prakasamreddy, Fundamentals of Medical Physiology, 4<sup>th</sup> Edition, Paras medical Publisher, Hyderabad, 2008
2. Sujit K. Chaudhuri, Concise Medical Physiology, 6<sup>th</sup> edition, New Central Book Agency, Kolkata, 2008

**Reference Book (Physiology):**

1. AK Khurana, InduKhurana: Anatomy and Physiology of Eye, Second edition,CBS Publishers New Delhi, 2006
2. A C Guyton: Text book of Medical Physiology, 8th edition, saunders company, Japan,
3. G J Tortora, B Derrickson: Principles of anatomy & physiology,11th edition, Harper & Row Publishers,New York
4. John Wiley & Sons Inc, New Jersey, 2007

## BOPT 102T- Physical Optics Theory (No. of lecture hrs assigned: 45 hrs)

Paper	Topics
II	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, Sources of light; Electromagnetic Spectrum, Polarized light; linearly polarized light; and circularly polarized light, Intensity of polarized light; Malus' Law; polarizers and analyzers; Methods of producing polarized light; Brewster's angle, Birefringence; ordinary and extraordinary rays, Relationship between amplitude and intensity, Coherence; interference; constructive interference, destructive interference; fringes; fringe width, Double slits, multiple slits, gratings, Diffraction; diffraction by a circular aperture; Airy's disc, Resolution of an instrument (telescope, for example); Raleigh's criterion, Scattering; Raleigh's scattering; Tyndall effect, Fluorescence and Phosphorescence, Basics of Lasers –coherence; population inversion; spontaneous emission; Einstein's theory of lasers, Radiometry; solid angle; radiometric units; photopic and scotopic luminous efficiency and efficacy curves; photometric units, Inverse square law of photometry; Lambert's law, Other units of light measurement; retinal illumination; Trolands

### Text book:

Subrahmanyam N, BrijLal, *A text book of Optics*, S. Chand Co Ltd, New Delhi, India, 2003.

### Reference books:

- Pedrotti L. S, Pedrotti Sr. F. L, *Optics and Vision*, Prentice Hall, New Jersey, USA, 1998.
- Keating NM. P, *Geometric, Physical and Visual Optics*, Butterworth- Heinemann, Massachusetts, USA, 2002.

## BOPT 103T- General Biochemistry Theory (No. of lecture hrs assigned: 45 hrs)

Paper	Topics
III	<b>Carbohydrates</b> (Glucose; fructose; galactose; lactose; sucrose; starch and glycogen (properties and tests, Structure and function), <b>Proteins</b> : Amino acids, peptides, and proteins (general properties & tests with a few examples like glycine, tryptophan, glutathione, albumin, hemoglobin, collagen), <b>Lipids</b> : Fatty acids, saturated and unsaturated, cholesterol and triacylglycerol, phospholipids and plasma membrane <b>Vitamins</b> : General with emphasis on A,B2, C, E and inositol (requirements, assimilation and properties), <b>Minerals</b> : Na, K, Ca, P, Fe, Cu and Se.(requirements, availability and properties)

### Text book:

S. Ramakrishnan: Essentials of biochemistry and ocular biochemistry, Annamalai University Publications, Chidambaram, India, 1992

### Reference books:

1. S. Ramakrishnan, K G Prasanna and R Rajan: Text book of Medical Biochemistry, Orient Longman, Madras, 1990
2. D.R. Whitehart: Biochemistry of the Eye, 2nd edition, Butterworth Heinemann, Pennsylvania, 2003

## BOPT 104-Nutrition Theory (No. of lecture hrs assigned: 45 hrs)

Paper	Topics
IV	<b>Introduction:</b> History of Nutrition, Nutrition as a science, Food groups, RDA, Balanced diet, diet planning, Assessment of nutritional status, <b>Energy:</b> Units of energy, Measurements of energy and value of food, Energy expenditure, Total energy/calorie requirement for different age groups and diseases, Satiety value, Energy imbalance-obesity, starvation, Limitations of the daily food guide, <b>Proteins:</b> Sources and functions, Essential and non-essential amino-acids, Incomplete and complete proteins, Supplementary foods, PEM and the eye, Nitrogen balance, Changes in protein requirement, <b>Fats:</b> Sources and functions, Essential fatty acids, Excess and deficiency, Lipids and the eye, Hyperlipidemia, heart diseases, atherosclerosis, <b>Minerals:</b> General functions and sources, Macro and micro minerals associated with the eye, Deficiencies and excess – ophthalmic complications (e.g. iron, calcium, iodine etc.), <b>Vitamins:</b> General functions, and food sources, Vitamin deficiencies and associated eye disorders with particular emphasis to Vitamin A, Promoting sound habits in pregnancy, lactation and infancy, Nutrient with antioxidant, Properties, Digestion of Proteins, carbohydrates & lipids, <b>Essential amino acids:</b> <b>Miscellaneous:</b> Measles and associated eye disorders, low birth weight

### Text books:

- M Swaminathan: Hand book of Food and Nutrition, fifth edition, Bangalore printing & publishing Co.Ltd, Bangalore,2004
- C Gopalan, BV Rama Sastri, SC Balasubramanian: Nutritive Value of Indian Foods , National Institute of Nutrition, ICMR, Hyderabad,2004
- Frank Eperjesi& Stephen Beatty: Nutrition and the Eye A practical Approach,Elsevier Butterworth-Heinemann, USA, 2006

**Reference books:** No recommendation. It is left to the faculty.

## BOPT 105P - General Anatomy & General Physiology Practical (60 hrs )

<b>1</b>	<p><b>Anatomy</b> Practical demonstration of each organ using specimen to understand the anatomic structures.</p> <p><b>Physiology (DEMONSTRATIONS)</b></p> <p><b>1. HEMATOLOGY –</b></p> <ul style="list-style-type: none"> <li>- Microscope, study of hemocytometer, Hb estimation</li> <li>- RBC count, WBC count</li> <li>- DLC</li> <li>- Blood Group, BT &amp; CT</li> <li>- ESR</li> </ul> <p><b>2. RESPIRATORY SYSTEM –</b></p> <ul style="list-style-type: none"> <li>- Clinical examination of respiratory system</li> <li>- Spirometry, Breath holding test</li> </ul> <p><b>3. CARDIOVASCULAR SYSTEM –</b></p> <ul style="list-style-type: none"> <li>- Clinical examination of circulatory system</li> <li>- Measurement of blood pressure and pulse rate.</li> </ul> <p><b>4. ENDOCRINE –</b></p> <ul style="list-style-type: none"> <li>- Photographs of clinical disorders</li> </ul>
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## BOPT 106P -Physical Optics Practicals (45 hrs)

Paper	Topics
<b>II</b>	<ol style="list-style-type: none"> <li>1. Gratings – determination of grating constant using Sodium vapour lamp; determination of wavelengths of light from Mercury vapour lamp</li> <li>2. Circular Apertures – measurements of Airy’s disc for apertures of various sizes</li> <li>3. Verification of Malus’ Law using a polarizer – analyzer combination</li> <li>4. Demonstration of birefringence using Calcite crystals</li> <li>5. Measurement of the resolving power of telescopes.</li> <li>6. Newton’s rings</li> <li>7. Demonstration of fluorescence and phosphorescence using crystals and paints</li> </ol>

## BOPT 107P - General Biochemistry Practicals (45 hrs)

Paper	Topics												
<b>III</b>	<ol style="list-style-type: none"> <li>1. <b>Reactions of monosaccharides, disaccharides and starch:</b> <table style="margin-left: 40px; border: none;"> <tr> <td style="padding-right: 40px;">Glucose</td> <td>Fructose</td> </tr> <tr> <td>Galactose</td> <td>Maltose, lactose</td> </tr> <tr> <td>Sucrose</td> <td>Starch</td> </tr> </table> </li> <li>2. <b>Analysis of Unknown Sugars</b>            Estimation:           <table style="margin-left: 40px; border: none;"> <tr> <td style="padding-right: 40px;">Photometry Biofluid of choice – blood, plasma, serum</td> <td></td> </tr> <tr> <td>Standard graphs</td> <td>Glucose</td> </tr> <tr> <td>Proteins</td> <td>Urea</td> </tr> </table> </li> </ol>	Glucose	Fructose	Galactose	Maltose, lactose	Sucrose	Starch	Photometry Biofluid of choice – blood, plasma, serum		Standard graphs	Glucose	Proteins	Urea
Glucose	Fructose												
Galactose	Maltose, lactose												
Sucrose	Starch												
Photometry Biofluid of choice – blood, plasma, serum													
Standard graphs	Glucose												
Proteins	Urea												

	Creatinine	Bilirubin
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**GENERAL ELECTIVE**

**BOPT 108-English and communication Theory (No. of lecture hrs assigned: 45 hrs)**

Paper	Topics
	<p>Functional English</p> <p><b>Unit 1</b> Basics of Grammar - Vocabulary, Synonyms, Antonyms, Prefix and Suffix, Homonyms, Analogies and Portmanteau words</p> <p><b>Unit II</b> Basics of Grammar – Part II - Active, Passive, Direct and Indirect speech, Prepositions, Conjunctions and Euphemisms</p> <p><b>Unit III</b> Writing Skills - Letter Writing, Email, Essay, Articles, Memos, one word substitutes, note making and Comprehension</p> <p><b>Unit IV</b> - Writing and Reading, Summary writing, Creative writing, news paper reading</p> <p><b>Unit V</b> - Practical Exercise, Formal speech, Phonetics, semantics and pronunciation</p> <p><b>Communication</b> <b>Introduction</b> - Communication process, Elements of communication, Barriers of communication and how to overcome them, Nuances for communicating with patients and their attenders in hospitals</p> <p><b>Speaking</b> - 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</p> <p><b>Listening</b> - Importance of listening , Self assessment, Action plan execution, Barriers in listening, Good and persuasive listening</p> <p><b>Reading</b> - What is efficient and fast reading , Awareness of existing reading habits, Tested techniques for improving speed, Improving concentration and comprehension through systematic study,</p> <p><b>Non Verbal Communication</b> - Basics of non-verbal communication, Rapport building skills using neuro- linguistic programming (NLP), Communication in Optometry practice</p>

**Text book:**

- 1) Graham Lock, Functional English Grammar : Introduction to second Language Teachers. Cambridge University Press, New York, 1996.
- 2) Gwen Van Servellen. Communication for Health care professionals: Concepts, practice and evidence, Jones & Bartlett Publications , USA, 2009

## SEMESTER II

<b>Code No.</b>	<b>Core Subjects</b>
BOPT 209 T	Ocular Anatomy & Physiology
BOPT 210 T	Geometrical Optics I & II
BOPT 211 T	Ocular Biochemistry
BOPT 212 T	Microbiology & Pathology
<b>Practical</b>	
BOPT 213 P	Ocular Anatomy & Physiology
BOPT 214 P	Geometrical Optics I & II
BOPT 215 P	Ocular Biochemistry
BOPT 216 P	Microbiology & Pathology (Multidisciplinary/Interdisciplinary)
<b>Generic Subject</b>	
BOPT 217	Bioethics & IPR

## SEMESTER II

### BOPT 209T- Ocular Anatomy & Physiology Theory (No. of lecture hrs assigned: 45 hrs)

Paper	Topics
1	<p><b>OCULAR ANATOMY</b></p> <p><b>CENTRAL NERVOUS SYSTEM(1hour each)</b> - Introduction to nervous system, Meninges and dural venous sinuses, Spinal cord, Brain stem, Cerebrum I, Cerebrum II, Cerebellum, CSF and ventricles, Optic nerve, Oculomotor nerve, Trochlear nerve, Trigeminal nerve-optic division, Abducent Nerve, <b>EYE-</b> Orbit, Sclera, Cornea, Choroid, Ciliary Body, Iris, Retina, Eyelids, Conjunctiva<b>REFRACTORY MEDIA-</b> Aqueous humor, Anterior chamber, Posterior chamber, Lens, Vitrous body <b>EMBRYOLOGY</b> – Gametogenesis, Menstrual Cycle &amp; Ovarian cycle, Fertilization, Implantation, Cleavage &amp; formation of germ layers, Development in 2nd week, Development in 3rd week, OcularEmbryology-I, OcularEmbryology-II</p> <p><b>OCULAR PHYSIOLOGY -</b></p> <p><b>Central Nervous system Lectures</b> - Neuron –Conduction of impulse, Synapse, Receptor, Reflexes, Ascending tracts, Cerebral cortex –functions, Cerebellum, Hypothalamus Thalamus –Basal ganglia, Autonomic nervous system, motor control of movements, posture and equilibrium, Conditioned reflex, eye hand co-ordination. <b>Special senses</b> - Olfaction Taste, Hearing <b>Ocular Physiology</b> - Protective mechanisms in the eye: Eye lids and lacrimation, description of the globe, Extrinsic eye muscles, their actions and control of their movements, Coats of the eye ball</p> <p>Cornea, Aqueous humor and vitreous: Intra ocular pressure, Iris and pupil, Crystalline lens and accommodation – presbyopia, Retina – structure and functions, Vision – general aspects of sensation, Pigments of the eye and photochemistry, The visual stimulus, refractive errors, Visual acuity, Vernier acuity and principle of measurement, Visual perception – Binocular vision, stereoscopic vision, optical illusions, Visual pathway, central and cerebral connections, Colour vision and colour defects. Theories and diagnostic tests, Introduction to electro physiology, Scotopic and Photopic vision, Color vision, Color mixing, Mechanism of accommodation, Retinal sensitivity and Visibility, Receptive stimulation and flicker, Ocular, movements and saccades, Visual perception and adaptation, Introduction to visual psychology (Psychophysics)</p>

**Text Book:**

1. L A Remington: Clinical Anatomy of the Visual System, Second edition, Elsevier Butterworth Heinemann, Missouri, USA, 2005.
2. AK Khurana, InduKhurana: Anatomy and Physiology of Eye, Second edition, CBS Publishers, New Delhi, 2006

**Reference Book:**

1. AK Khurana, InduKhurana: Anatomy and Physiology of Eye, Second edition, CBS Publishers, New Delhi, 2006
2. RD Ravindran: Physiology of the eye, Arvind eye hospitals, Pondicherry, 2001
3. PL Kaufman, A Alm: Adler’s Physiology of the eye clinical application, 10th edition, Mosby, 2002



**BOPT 210T - Geometrical Optics I & II Theory (No. of lecture hrs assigned: 45 hrs)**

Paper	Topics
II	<p><b>Geometrical Optics I</b> - Nature of light –light as electromagnetic oscillation; ideas of sinusoidal oscillations; amplitude and phase; speed of light in vacuum and other media; refractive index, Wave fronts–spherical, elliptical and plane; Curvature and vergence; rays; convergence and divergence in terms of rays and vergence; vergence at a distance, Refractive index; its dependence on wavelength, Fermat’s and Huygen’s Principle –Derivation of laws of reflection and refraction (Snell’s law) from these principles, Plane mirrors –height of the mirror; rotation of the mirror, Reflection by a spherical mirror –paraxial approximation; sign convention; derivation of vergence equation, Imaging by concave mirror, convex mirror, 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 prism, Prisms; angular dispersion; dispersive power; Abbe’s number, Definition of crown and flint glasses; materials of high refractive index, Thin prism –definition; definition of Prism diopter; deviation produced by a thin prism; it dependence on refractive index, Refraction by a spherical surface; sign convention; introduction to spherical aberration using image formed by a spherical surface of a distance object; sag formula, 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, 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 principal planes/points; primary and secondary focal planes/points; primary and secondary focal lengths, Newton’s formula; linear magnification; angular magnification, Nodal Planes, Thin lens as a special case of thick lens; review of sign convention, 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</p> <p><b>Geometrical Optics II</b> - Vergence and vergence techniques revised, Gullstrand’s schematic eyes, visual acuity, Stile Crawford, Emmetropia and ametropia, Blur retinal Imaginary, Correction of spherical ammetropia, vertex distance and effective power, dioptric power of the spectacle, to calculate the dioptric power, angular magnification of spectacles in aphakic, Thin lens model of the eye –angular magnification –spectacle and relative spectacle magnification, Aperture stops- entrance and exit pupils, Astigmatism. - To calculate the position of the line image in a sphero-cylindrical lens, Accommodation –Accommodation formulae and calculations, Presbyopia- Spectacle magnification, angular magnification of spectacle lens, near point, calculation of add, depth of field, Spatial distribution of optical information- modulation transfer functions- Spatial filtering- applications, Visual optics of aphakia and pseudophakia.</p>

**Text book:**

- Tunnacliffe A. H, Hirst J. G, Optics, The association of British Dispensing Opticians, London, U.K., 1990.

- Pedrotti L. S, Pedrotti Sr. F. L, Optics and Vision, Prentice Hall, New Jersey, USA, 1998

**Reference books:**

- Loshin D. S. The Geometric Optics Workbook, Butterworth-Heinemann, Boston, USA, 1991.
- Schwartz S. H. Geometrical and Visual Optics: A Clinical Introduction, McGraw-Hill, New York, USA, 2002.

**BOPT 211T - Ocular Biochemistry Theory (No. of lecture hrs assigned: 45 hrs)**

Paper	Topics
III	Hormones basic concepts in metabolic regulation with examples say insulin, Metabolism: General whole body metabolism (carbohydrates, proteins, lipids), Ocular Biochemistry: Various aspects of the eye, viz., cornea, lens aqueous, vitreous, retina and pigment rhodopsin. (The important chemicals in each and their roles.), Immunology of anterior segment, Technique: Colloidal state, sol. Gel. Emulsion, dialysis, electrophoresis. pH buffers mode of action, molar and percentage solutions, photometer, colorimeter and spectrometry. Radio isotopes: application in medicine and basic research, Clinical Biochemistry: Blood sugar, urea, creatinine and bilirubin significance of their estimation.

**Text book:**

- S. Ramakrishnan: Essentials of biochemistry and ocular biochemistry, Annamalai University Publications, Chidambaram, India, 1992

**Reference Books:**

- S. Ramakrishnan, K G Prasanna and R Rajan: Text book of Medical Biochemistry, Orient Longman, Madras, 1990
- D R Whikehart: Biochemistry of the Eye, 2nd edition, Butterworth Heinemann, Pennsylvania, 2003

**BOPT 212T - Microbiology & Pathology Theory (No. of lecture hrs assigned: 45 hrs)**

Paper	Topics
IV	<p><b>Microbiology</b> Morphology and principles of cultivating bacteria, Sterilization and disinfections used in laboratory and hospital practice, Common bacterial infections of the eye, Common fungal infections of the eye, Common viral infections of the eye, Common parasitic infections of the eye.</p> <p><b>Pathology</b> Inflammation and repair, Infection in general, Specific infections–Tuberculosis, Leprosy, Syphilis, Fungal infection, Viral chlamydial infection; Neoplasia; Haematology – Anemia, Leukemia, Bleeding disorders; Circulatory disturbances – Thrombosis, Infarction, Embolism; Clinical pathology- Interpretation of urine report, Interpretation of blood smears; Immune system; Shock, Anaphylaxis; Allergy</p>

**Text books:**

- Burton G.R.W: Microbiology for the Health Sciences, third edition, J.P. Lippincott Co., St. Louis, 1988.
- M J Pelczar (Jr), ECS Chan, NR Krieg : Microbiology ,fifth edition, TATA McGRAW-HILL Publisher, New Delhi,1993
- K S Ratnagar: Pathology of the eye & orbit, Jaypee brothers Medical Publishers, 1997

**Reference Books:**

- KJ Ryan, CG Ray: Sherris Medical Microbiology- An Introduction to infectious Diseases, fourth edition, McGRAWHILL Publisher, NewDelhi, 1994 MACKIE & McCartney Practical Medical Microbiology
- SYDNEY M. FINEGOLD & ELLEN JO BARON: Diagnostic Microbiology (DM) 5) Prerequisites: Higher secondary Biology
- Corton Kumar and Robins: Pathological Basis of the Disease, 7th Edition, Elsevier, New Delhi, 2004.
- S R Lakhani Susan AD & Caroline JF: Basic Pathology: An introduction to the mechanism of disease, 1993

### BOPT 213P Ocular Anatomy & Physiology Practicals

Paper	Topics
I	<p><b>Central Nervous System:</b> Sensory system, Motor system, Cranial system, Test for hearing</p> <p><b>Ocular Physiology :</b> Lid movements, Tests for lacrimation tests, Extra ocular movements, Break up time, Pupillary reflexes, Applanation tonometry, Schiottz tonometry, Measurement of accommodation and convergence, Visual acuity measurement, Direct ophthalmoscopy, Indirect ophthalmoscopy, Retinoscopy, Light and dark adaptation, Binocular vision (Stereopsis).</p>

### BOPT 214P-Geometrical Optics I & II Practicals

Paper	Topics
II	<p><b>Thick Prism</b> – Determination of prism angle and dispersive power; calculation of the refractive index, Thin Prism – measurement of deviation; calculation of the prism diopter, Image formation by spherical mirrors, Convex lens - power determination using lens gauge, power determination using distant object method; power determination using the vergence formula, Concave lens – in combination with a convex lens – power determination.</p> <p><b>Construction of a tabletop telescope – all three types of telescopes</b> - Construction of a tabletop microscope, Imaging by a cylindrical lens – relationship between cylinder axis and image orientation, 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, 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</p>

### BOPT 215P -Ocular Biochemistry Practical

Paper	Topics
III	<ol style="list-style-type: none"> <li>1. Quantitative analysis</li> <li>2. Abnormal constituents in urine, sugar proteins, ketones, blood and bile salts.</li> <li>3. Techniques of detection of abnormal constituents of urine:               <ol style="list-style-type: none"> <li>a. Electrophoresis</li> <li>b. Chromatography</li> <li>c. Preparation of normal, molar and percentage solutions.</li> <li>d. Preparation of buffers, pH determination</li> </ol> </li> <li>4. Demonstration               <ol style="list-style-type: none"> <li>a. Estimation of blood cholesterol</li> <li>b. Estimation of alkaline phosphatase.</li> </ol> </li> </ol>

	<p>c. Salivary amylase (effect of ph, etc)</p> <p>d. Milk analysis.</p>
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### BOPT 216P - Microbiology & Pathology Practical

Paper	Topics
IV	<p>Microbiology:</p> <p>General Characters of Microbes</p> <ul style="list-style-type: none"> <li>• Morphology, staining methods</li> <li>• Culture media and culture methods+ABS</li> <li>• Collection of specimen, transport and processing</li> </ul> <p>Chemical methods of sterilization</p> <p>Immunity</p> <ul style="list-style-type: none"> <li>• Antigen, Antibody</li> </ul> <p>Systemic Bacteriology</p> <ul style="list-style-type: none"> <li>• Gram Negative Cocci</li> <li>• Mycobacteria</li> <li>• Spirochaetes</li> </ul> <p>Mycology - outline of lab diagnosis</p> <p>Virology - outline of lab diagnosis</p> <p>Parasitology –outline of lab diagnosis</p> <ul style="list-style-type: none"> <li>• Vectors</li> </ul> <p>Pathology</p> <p>Working and maintenance of instruments</p> <p>General principles of Histopathology techniques collection, fixation, processing &amp; routine staining</p> <p>General principles of Cyto pathology techniques collection fixation, processing &amp; routine staining</p> <p>General principles of Haematology techniques collection, fixation, processing, routine staining, Haemoglobin, TLC, DLC, Peripheral smear, automatic cell counter</p> <p>General principles of Clinical Pathology techniques sample collection, processing for routine test, normal urine&amp; urine examination</p> <p>General principles of Blood Bank techniques antigen, antibody, ABO &amp; Rh system</p> <p>General principles of Autopsy &amp; Museum</p>

## GENERAL SUBJECT

### BOPT 217 - Bioethics & IPR (No. of lecture hrs assigned: 45 hrs)

Paper	Topics
1	Introduction to Bioethics Bioethical issues related to Healthcare & medicine . Anatomy - Cadaver ethics, Human dignity, PNDT, Disposal of cadaver. Physiology - Animal ethics, Health policy privacy. Biochemistry & Pathology - Prudence of investigation confidentiality, Patients bill of rights, Disposal of investigative material, Integrity, Blood transfusion. Pharmacology - Rational drug prescribing, Clinical trials, Risk minimization, Animal ethics. Microbiology - Hand wash, Drug resistance minimization, Prudence of investigation confidentiality, Sterilization procedure, Biosafety and bio hazard.
2	Introduction to Intellectual Property: Concept of Intellectual Property Kinds of Intellectual Property Patents Copyrights Designs Trademarks Geographical Indication Infringement of IPR Its protection and Remedies Licensing and its types

#### Reference books

1. Contemporary issues in bioethics – Beauchamp & walters (B&W ) 4th edition.
2. Classic philosophical questions by Gloud (8<sup>th</sup> Edition)
3. Case book series and booklets by UNESCO Bioethics Core curriculum 2008
4. Encyclopedia of Bioethics 5 vol set, (2003) ISBN-10: 0028657748
5. Intellectual property rights- Ganguli-Tat McGrawhill. (2001) ISBN-10: 0074638602,
6. Intellectual Property Right- Wattal- Oxford Publicatiopn House.(1997) ISBN:0195905024.

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## SEMESTER III

Code No.	Core Subjects
BOPT 318 T	Physical Optics
BOPT319 T	Geometrical Optics
BOPT320 T	Visual Optics I/II
BOPT321 T	Ocular diseases I
BOPT322 T	Clinical Examinations and Visual systems
<b>Practical</b>	
BOPT 323 P	Physical Optics
BOPT324 P	Geometrical Optics
BOPT 325 P	Visual Optics I/II
BOPT326 P	Clinical Examinations and Visual systems
<b>Generic Elective Course</b>	
GEC 001T	Pursuit of Inner Self Excellence (POIS)
GEC 002T	Organizational Behaviour

### BOPT 318 T - Physical Optics

Sr no.	Topics	No of hrs
1	Nature of light –light as electromagnetic oscillation –wave equation;	3
2	ideas of sinusoidal oscillations –simple harmonic oscillation; transverse nature of oscillation; concepts of frequency, wavelength, amplitude and phase,	8
3	Sources of light; Electromagnetic Spectrum, Polarized light; linearly polarized light; and circularly polarized light, Intensity of polarized light; Malus' Law; polarizers and analyzers; Methods of producing polarized light; Brewster's angle, Birefringence; ordinary and extraordinary rays, Relationship between amplitude and intensity, Coherence; interference; constructive interference, destructive interference; fringes; fringe width, Double slits, multiple slits, gratings, Diffraction; diffraction by a circular aperture; Airy's disc, Resolution of an instrument (telescope, for example); Raleigh's criterion, Scattering; Raleigh's scattering; Tyndall effect, Fluorescence and Phosphorescence,	17
4	Basics of Lasers –coherence; population inversion; spontaneous emission; Einstein's theory of lasers, Radiometry; solid angle; radiometric units; photopic and scotopic luminous efficiency and efficacy curves; photometric units, Inverse square law of photometry; Lambert's law,	13
5	Other units of light measurement; retinal illumination; Trolands	4
	<b>Total</b>	<b>45 hrs</b>

### BOPT 323 P - Physical Optics(60 hrs)

Sr no.	Topics
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



**Text book:**

Subrahmanyam N, BrijLal, *A text book of Optics*, S. Chand Co Ltd, New Delhi, India, 2003.

**Reference books:**

- Pedrotti L. S, Pedrotti Sr. F. L, *Optics and Vision*, Prentice Hall, New Jersey, USA, 1998.
- Keating NM. P, *Geometric, Physical and Visual Optics*, Butterworth- Heinemann, Massachusetts, USA, 2002.

## BOPT319 T - Geometrical Optics

Sr no.	Topics	No of Hrs
1	<b>Geometrical Optics I</b> - Nature of light –light as electromagnetic oscillation; ideas of sinusoidal oscillations; amplitude and phase; speed of light in vacuum and other media; refractive index, Wave fronts–spherical, elliptical and plane; Curvature and vergence; rays; convergence and divergence in terms of rays and vergence; vergence at a distance, Refractive index; its dependence on wavelength,	<b>5</b>
2	Fermat’s and Huygen’s Principle –Derivation of laws of reflection and refraction (Snell’s law) from these principles, Plane mirrors –height of the mirror; rotation of the mirror,	<b>2</b>
3	Reflection by a spherical mirror –paraxial approximation; sign convention; derivation of vergence equation, Imaging by concave mirror, convex mirror, 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 prism, Prisms; angular dispersion; dispersive power; Abbe’s number, Definition of crown and flint glasses; materials of high refractive index,	<b>5</b>
4	Thin prism –definition; definition of Prism diopter; deviation produced by a thin prism; its dependence on refractive index, Refraction by a spherical surface; sign convention; introduction to spherical aberration using image formed by a spherical surface of a distance object; sag formula, 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,	<b>5</b>
5	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 principal planes/points; primary and secondary focal planes/points; primary and secondary focal lengths,	<b>6</b>
6	Newton’s formula; linear magnification; angular magnification, Nodal Planes, Thin lens as a special case of thick lens; review of sign convention, Imaging by a	<b>6</b>

	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	
6	<b>Geometrical Optics II</b> - Vergence and vergence techniques revised, Gullstrand's schematic eyes, visual acuity, Stile Crawford, Emmetropia and ametropia, Blur retinal Imaginary, Correction of spherical ammetropia, vertex distance and effective power, dioptric power of the spectacle, to calculate the dioptric power, angular magnification of spectacles in aphakic,	<b>5</b>
7	Thin lens model of the eye –angular magnification –spectacle and relative spectacle magnification,	<b>3</b>
8	Aperture stops- entrance and exit pupils,	<b>2</b>
9	Astigmatism. - To calculate the position of the line image in a sphero-cylindrical lens,	<b>2</b>
10	Accommodation –Accommodation formulae and calculations, Presbyopia- Spectacle magnification, angular magnification of spectacle lens, near point, calculation of add, depth of field,	<b>2</b>
11	Spatial distribution of optical information- modulation transfer functions- Spatial filtering- applications, Visual optics of aphakia and pseudophakia.	<b>2</b>
	<b>Total</b>	<b>45 hrs</b>

### **BOPT 324 P - Geometrical Optics(60 hrs)**

<b>Sr no.</b>	<b>Topics</b>
1	Thick Prism – determination of prism angle and dispersive power; calculation of the refractive index,
2	Thin Prism – measurement of deviation; calculation of the prism diopter, Image formation by spherical mirrors,
3	Convex lens - power determination using lens gauge, power determination using distant object method; power determination using the vergence formula,

4	Concave lens – in combination with a convex lens – power determination.
5	Construction of a tabletop telescope – all three types of telescopes - Construction of a tabletop microscope
6	, Imaging by a cylindrical lens – relationship between cylinder axis and image orientation,
7	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,
8	Imaging by a spherocylindrical lens – sphere and cylinder in contact
9	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

**Books:**

**Text book:**

- Tunnacliffe A. H, Hirst J. G, Optics, The association of British Dispensing Opticians, London, U.K., 1990.
- Pedrotti L. S, Pedrotti Sr. F. L, Optics and Vision, Prentice Hall, New Jersey, USA, 1998

**Reference books:**

- Loshin D. S. The Geometric Optics Workbook, Butterworth-Heinemann, Boston, USA, 1991.
- Schwartz S. H. Geometrical and Visual Optics: A Clinical Introduction, McGraw-Hill, New York, USA, 2002.

## BOPT 320T -Visual Optics I/II

Sr. No	Topics	No of Hrs
1	<b>Review of Geometrical Optics: Vergence and power:</b> Conjugacy, object space and image space, Sign convention, Spherical refracting surface, Cardinal points, Magnification, Light and visual function, Clinical Relevance of: Fluorescence, Interference, Diffraction, Polarization, Aberration and application Spherical and Chromatic	17
2	<b>Optics of Ocular Structure :</b> Cornea and aqueous , Crystalline lens, Vitreous Schematic and reduced eye	16
3	<b>Measurements of Optical Constants of the Eye:</b> Corneal curvature and thickness, Keratometry, Curvature of the lens , Axial length and axis of the eye, Basic Aspects of Vision., Visual Acuity, Light and Dark Adaptation, Color Vision, Spatial and Temporal Resolution	15
4	<b>Refractive anomalies and their causes:</b> Etiology of refractive anomalies, Contributing variability and their ranges, Growth of the eye in relation to refractive errors	12
	Total	<b>60 hrs</b>

## BOPT325 P - Visual Optics I/II (60 hrs)

Sr no	Topic
1	Study of Purkinje image II and I.
2	Study of Purkinje image III and IV.
3	Measurement of corneal curvature
4	Measurement of corneal thickness
5	Assessment with schematic eye
6	Conjugate points – demonstration- worked examples
7	Visual acuity charts
8	Vision through pinhole, slit, filters, etc.
9	Visual acuity, stereo acuity in emmetropia
10	Myopia and pseudomyopia, myopia and visual acuity
11	Myopic correction- subjective verification and monocular and binocular

12	Hypermetropia – determination of manifest error subjectively
13	Hypermetropic correction- subjective verification
14	Demonstration of astigmatism: Use of slit and keratometry to find the principal meridians

### **Text books**

- A H Tunnacliffe: Visual optics, The Association of British Optician, 1987
- AG Bennett & RB Rabbets: Clinical Visual optics, 3rd edition, Butterworth Heinemann, 1998

### **Reference books**

- M P Keating: Geometric, Physical and Visual optics, 2nd edition, Butterworth-Heinemann, USA, 2002
- HL Rubin: Optics for clinicians, 2nd edition, Triad publishing company. Florida, 1974.
- H Obstfeld: Optic in Vision- Foundations of visual optics & associated computations, 2nd edition, Butterworth, UK, 1982.
- WJ Benjamin: Borish's clinical refraction, 2nd edition, Butterworth Heinemann, Missouri, USA, 2006
- T Grosvenor: Primary Care Optometry, 4th edition, Butterworth –heinneman, USA, 2002

## BOPT321 T - Ocular Diseases I

Sr. No	Topics	No of Hrs
1	<b>Orbit</b> :Applied Anatomy, Proptosis (Classification, Causes, Investigations) , Enophthalmos, Orbital Inflammations (Preseptal cellulites, Orbital cellulitis cavernous sinus Thrombosis) ,Grave’s Ophthalmopathy, Orbital blowout fractures, Approach to a patient with proptosis	10
2	<b>Lids</b> :Applied Anatomy , Congenital anomalies ( Ptosis, Coloboma, Epicanthus, Distichiasis, Cryptophthalmos), Oedema of the eyelids(Inflammatory, Solid, Passive edema), Inflammatory disorders (Blepharitis, External Hordeolum, Chalazion, Internalhordeolum,, MolluscumContagiosum) , Anomalies in the position of the lashes and Lid Margin (Trichiasis, Ectropion, Entropion, Symblepharon, Blepharophimosis, Lagophthalmos, Blepharospasm, Ptosis)., Tumors (Papillomas, Xanthelasma, Haemangioma, Basal carcinoma, Squamous cell carcinoma, sebaceous gland melanoma)	10
3	<b>Lacrimal System</b> :Applied Anatomy, Tear Film , The Dry Eye ( Sjogren’s Syndrome), The watering eye ( Etiology, clinical evaluation), Dacryocystitis, Swelling of the Lacrimal gland( Dacryoadenitis)	10
4	<b>Conjunctiva</b> : Applied Anatomy ,Inflammations of conjunctiva ( Infective conjunctivitis – bacterial, chlamydial, viral , Allergic conjunctivitis, Granulomatous conjunctivitis) , Degenerative conditions( Pinguecula, Pterygium, Concretions) , Symptomatic conditions( Hyperaemia, Chemosis, Ecchymosis, Xerosis, Discoloration), Cysts and Tumors	10
5	<b>Cornea</b> :Applied Anatomy and Physiology,Congenital Anomalies (Megalocornea, Microcornea, Cornea plana, Congenital cloudy cornea), Inflammations of the cornea (Topographical classifications: Ulcerative keratitis and Non ulcerative, Etiological classifications: Infective, Allergic, Trophic, Traumatic, Idiopathic)), Keratoconus, Keratoglobus, Corneal oedema, Corneal opacity, Corneal vascularisation, Penetrating Keratoplasty	10
6	<b>Uveal Tract and Sclera</b> :Applied Anatomy, Classification of uveitis, EtiologyPathology ,Anterior Uveitis, Posterior Uveitis, Purulent Uveitis, Endophthalmitis, Panophthalmitis, Pars Planitis, Episcleritis and scleritis, Clinical examination of Uveitis and Scleritis	10
	Total	<b>60 hrs</b>

### Books:

#### Text book:

- A K Khurana: Comprehensive Ophthalmology, 4th edition, New age international (p) Ltd. Publishers, New Delhi, 2007

#### Reference books:

- Stephen J. Miller : Parsons Diseases of the Eye, 18th edition, Churchill Livingstone, 1990
- Jack J. Kanski Clinical Ophthalmology: A Systematic Approach, 6th edition, Butterworth - Heinemann, 2007

## BOPT 322T -Clinical Examinations and Visual systems

<b>Sr no.</b>	<b>Topics</b>	<b>No of Hrs</b>
1	History taking, Visual acuity estimation , Extra ocular motility, Cover test, Alternating cover test, Hirschberg test, Modified Krimsky, Pupils Examination, Maddox Rod,	8
2	<b>Van Herrick,</b> External examination of the eye, Lid Eversion , Schirmer's, TBUT, tear meniscus level, NITBUT (keratometer), Color Vision, Stereopsis, Confrontation test,	10
3	<b>Photostress test,</b> Slit lamp biomicroscopy, Ophthalmoscopy, Tonometry, ROPLAS, Amsler test,	5
4	<b>Contrast sensitivity function test,</b> Saccades and pursuit test	7
	<b>Total</b>	<b>30 hrs</b>



## **BOPTOM 326P - Clinical Examinations and Visual systems (60 hrs)**

<b>Sr no</b>	<b>Topic</b>
1	Recording visual acuity for distance and near
2	Examining color vision using Ishihara chart
3	Recording Visual acuity using various methods
4	Confrontation test
5	Lacrimal function test – Tear BUT, Schirmer' test
6	All Objective method of refraction – retinoscopy, Auto – refractor, Keratometer etc.
7	Recording history with respect to optical, medical, family, chief complain etc.
8	Cover tests
9	Amsler test
10	Schiotz Tonometry

### **Text book:**

- T Grosvenor: Primary Care Optometry, 5th edition, Butterworth –Heinemann, USA, 2007.

### **Reference books**

- A K Khurana: Comprehensive Ophthalmology, 4th edition, New age international(p) Ltd. Publishers, New Delhi, 2007
- D B. Elliott :Clinical Procedures in Primary Eye Care,3rd edition, Butterworth-Heinemann, 2007
- Jack J. Kanski Clinical Ophthalmology: A Systematic Approach,6th edition,Butterworth-Heinemann, 2007
- J.B Eskridge, J F. Amos, J D. Bartlett: Clinical Procedures in Optometry,Lippincott Williams and Wilkins,1991
- N B. Carlson , DI Kurtz: Clinical Procedures for Ocular Examination ,3rd edition,McGraw-Hill Medical, 2003

## Generic Elective Course

### GEC 001T - Pursuit of Inner Self Excellence (POIS)

Sr no	Topic	No of Hrs
1	<b>Spiritual Values for human excellence :</b> The value of human integration; Compassion, universal love and brotherhood (Universal Prayer) ; Heart based living ; Silence and its values, Peace and non-violence in thought, word and deed ; Ancient treasure of values - Shatsampatti , Patanjali's Ashtanga Yoga , Vedic education - The role of the Acharya , values drawn from various cultures and religious practices - Ubuntu, Buddhism, etc.; Why spirituality? Concept – significance ; Thought culture	<b>15</b>
2	<b>Ways and Means :</b> Correlation between the values and the subjects ; Different teaching techniques to impart value education; Introduction to Brighter Minds initiative; Principles of Communication; Inspiration from the lives of Masters for spiritual values - Role of the living Master	<b>10</b>
3	<b>Integrating spiritual values and life:</b> Relevance of VBSE (Value Based Spiritual Education) in contemporary life ; Significant spiritual values ; Spiritual destiny ; Principles of Self-management; Designing destiny	<b>10</b>
4	<b>Experiencing through the heart for self-transformation (Heartfulness Meditation):</b> Who am I? ; Introduction to Relaxation; Why, what and how HFN Meditation?; Journal writing for Self-Observation ; Why, what and how HFN Rejuvenation (Cleaning)? ; Why, what and how HFN connect to Self (Prayer)?; Pursuit of inner self excellence ; Collective Consciousness-concept of <i>egregore effect</i> ;	<b>10</b>
	<b>Total</b>	<b>45 hrs</b>

**Books:**

- The Art of Learning: **A Journey in the Pursuit of Excellence**, Josh Waitzkin, Simon and Schuster, 2007
- Reality at Dawn. By Shri Ram Chandra, Published by ISRC

## Generic Elective Course

### GEC 002T - Organizational Behavior THEORY

Sr no	Topic	No of Hrs
1	Organizational Behavior - Definition - Importance - Historical Background - Fundamental concepts of OB - 21st Century corporate - Different models of OB i.e. autocratic, custodial, supportive	6
2	<b>Organization Structure and Design</b> - Authority and Responsibility Relationships - Delegation of Authority and Decentralization - Interdepartmental Coordination - Emerging Trends in Corporate Structure, Strategy and Culture - Impact of Technology on Organizational design - Mechanistic vs Adoptive Structures – Formal and Informal Organization	8
3	Perception Process - Nature & Importance - Perceptual Selectivity - Perceptual Organization - Social Perception - Impression Management	6
4	Learning - Process of Learning - Principles of Learning - Organizational Reward Systems - Behavioral Management	6
5	Motivation - Motives - Characteristics - Classification of motives - Primary Motives - Secondary motives - Morale - Definition and relationship with productivity - Morale Indicators	6
6	Leadership - Definition - Importance - Leadership Styles - Models and Theories of Leadership Styles	7
7	Conflict Management - Traditional vis-a-vis Modern view of conflict - Constructive and Destructive conflict - Conflict Process - Strategies for encouraging constructive conflict - Strategies for resolving destructive conflict	6
	Total	<b>45 hrs</b>

#### Books:

1. Organizational Behavior, 9th Ed. - Stephen Robbins
2. Human Behaviour at work - Davis and Newstorm
3. Organizational Behaviour - Uma Sekaran
4. Organizational Behaviour - Fred Luthans
5. Organizational Behaviour - K. Aswathappa
6. Human Behaviour at Work - Keith Davis
7. Organizational Behaviour - Jit S. Chandran
8. Human Relations & Organizational Behaviour - R.S. Dwivedi
9. Organizational Behaviour - McShane

## SEMESTER IV

<b>Code No.</b>	<b>Core Subjects</b>
BOPT427 T	Optometric Optics I & II
BOPT 428 T	Ocular Diseases II & Glaucoma
BOPT 429 T	Dispensing Optics
BOPT 430 T	Optometric Instrumentation
BOPT 431 T	Ocular Pharmacology
<b>Practical</b>	
BOPT 432 P	Optometric Optics I & II
BOPT 433 P	Dispensing optics
BOPT 434 P	Optometric Instrumentation
<b>Ability Enhancement Course</b>	
AEC 003T	Computers and applications
AEC 004T	Biostatistics and Research Methodology

## BOPT427 T - Optometric Optics I & II

Sr. No	Topics	No of Hrs
1	<b>Introduction</b> –Light, Mirror, Reflection, Refraction and Absorption,	3
2	<b>Prisms</b> –Definition, properties, Refraction through prisms, Thickness difference, Base-apex notation, uses, nomenclature and units, Sign Conventions, Fresnel’s prisms, rotary prisms,	3
3	<b>Lenses</b> –Definition, units, terminology used to describe, form of lenses ,Vertex distance and vertex power.	3
4	<b>Lens shape</b> , size and types i.e .spherical, cylindrical and Sphero-cylindrical	2
5	<b>Transpositions</b> –Simple, Toric and Spherical equivalent.	2
6	<b>Prismatic effect</b> , centration, decentration and Prentice rule, Prismatic effect of Plano-cylinder and Sphero cylinder lenses.	2
7	<b>Magnification in high</b> plus lenses, Minification in high minus lenses.	2
8	<b>Tilt induced power in spectacles.</b>	2
9	<b>Aberration in Ophthalmic Lenses</b>	1
10	<b>Spectacle Lenses - II:</b> Manufacture of glass, Lens materials,	2
11	<b>Lens surfacing(only theory), Principle of surface generation and glass cements(only theory), Terminology used in Lens workshop(only theory),</b>	5
12	Lens properties, Lens quality, Faults in lens material, Faults on lens surface,	2
13	<b>Methods of Inspecting the quality of lenses(only theory),</b> Safety standards for ophthalmic lenses (FDA, ANSI, ISI, Others)	4
14	<b>Spectacle Frames:</b> Types and parts, Classification of spectacle frames-material, weight, temple position, Coloration,	4
15	<b>Frame construction(only theory),</b> Frame selection, Size, shape, mounting and field of view of ophthalmic lenses	4
16	<b>Tinted &amp; Protective Lenses:</b> Characteristics of tinted lenses Absorptive Glasses, Polarizing Filters, Photochromic & Reflecting filters, Safety lenses-Toughened lenses, Laminated Lenses, CR 39, Polycarbonate lense	5
17	<b>Multifocal Lenses:</b> Introduction, history and development, types, Bifocal lenses, Trifocal & Progressive addition lenses	4
18	<b>Reflection from spectacle lens surface &amp; lens coatings:</b> Reflection from spectacle	5

	lenses - ghost images -Reflections in bifocals at the dividing line, Antireflection coating, Mirror coating, Hard Multi Coating [HMC], Hydrophobic coating	
19	<b>Miscellaneous Spectacle:</b> Iseikonic lenses, Spectacle magnifiers, Recumbent prisms Fresnel prism and lenses, Lenticular & Aspheric lenses, High Refractive index glasses	5
<b>Total</b>		<b>60 hrs</b>

### **BOPT432P - Optometric Optics I & II(90 hrs)**

<b>Sr no</b>	<b>Topics</b>
1	Hand Neutralization of Ophthalmic lenses
2	Transposition – Simple and Toric prescription
3	Measurement of Inter Pupillary Distance
4	Solving problems of vergence calculation
5	Use of lensometer for spherical lenses & cylindrical lenses – Power and center marking
6	Solving problems on centration & decentration
7	Using Geneva Lens measure to find out surface power of lenses
8	Use of lensometer for finding out power of all type of lenses, marking – center, axis , measuring power of prism.
9	Progressive Lenses - Measurement
10	Progressive Lenses - Fitting
11	Progressive Lenses - Verification
12	Progressive Lenses - Trouble Shooting

#### **Text book/reference books:**

- Jalie MO: Ophthalmic lens and Dispensing, 3rd edition, Butterworth –Heinemann, 2008
- Troy E. Fannin, Theodore Grosvenor: Clinical Optics, 2nd edition, Butterworth –Heinemann, 1996
- Michael P Keating: Geometric, Physical & Visual Optics, 2nd edition, Butterworth –Heinemann, 2002

#### **Reference books (Optometric Optics I):**

1. David Wilson: Practical Optical Dispensing, OTEN- DE, NSW TAFE Commission, 1999
2. C V Brooks, IM Borish: System for Ophthalmic Dispensing, Second edition, Butterworth-Heinemann, USA, 1996

## BOPT428 T - Ocular Diseases II & Glaucoma

Sr no	Topic	No of hrs
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 Detachment: Rhegmatogenous, Tractional, Exudative),Retinoblastoma, Diabetic retinopathy	12
2	Ocular Injuries: Terminology : Closed globe injury ( contusion, lamellar laceration) Open 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	12
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,Lenscoloboma, Lenticonus, Microspherophakia.	12
4	Clinical Neuro-ophthalmology: Anatomy of visual pathway,Lesions of the visual pathway, Pupillary reflexes and abnormalities (Amaurotic light reflex, Efferent pathway defect, Wernicke's hemianopic pupil, Marcus gunn pupil. Argyll Robertson pupil, Adie's tonic pupil), Optic neuritis, Anterior Ischemic optic neuropathy, Pappilloedema, optic atrophy, Cortical blindness, Malingering, Nystagmus, Clinical	12

	examination	
<b>5</b>	Glaucoma: Applied anatomy and physiology of anterior segment, Clinical Examination, Definitions and classification of glaucoma, Pathogenesis of glaucomatous ocular damage, Congenital glaucoma's, Primary open angle glaucoma, Ocular hypertension, Normal Tension Glaucoma, Primary angle closure glaucoma ( Primary angle closure suspect, Intermittent glaucoma, acute congestive, chronic angle closure), Secondary Glaucoma's, Management : common medications, laser intervention and surgical techniques	12
	<b>Total</b>	<b>60 hrs</b>

**Text book:**

- A K Khurana: Comprehensive Ophthalmology, 4th edition, New age international (p) Ltd. Publishers, New Delhi, 2007

**Reference books:**

- Stephen J. Miller : Parsons Diseases of the Eye, 18th edition, Churchill Livingstone, 1990
- Jack J. Kanski Clinical Ophthalmology: A Systematic Approach, 6th edition, Butterworth - Heinemann, 2007



### BOPT 429T- Dispensing Optics

Sr. No.	Topics	No of hrs
1	Components of spectacle prescription & interpretation, transposition, Add and near power relation,	6
2	Frame selection –based on spectacle prescription, professional requirements, age group, face shape	6
3	Measuring Inter-pupillary distance (IPD) for distance & near, bifocal height	6
4	Lens & Frame markings, Pupillary centers, bifocal heights, Progressive markings & adjustments –facial wrap, pantoscopic tilt	6
5	Recording and ordering of lenses (power, add, diameter, base, material, type, lens enhancements)	6
6	Neutralization –Hand & lensometer, axis marking, prism marking	6
7	Faults in spectacles (lens fitting, frame fitting, patients complaints, description, detection and correction)	6
8	Special types of spectacle frames :Monocles Ptoisis crutches, Industrial safety glasses, Welding glasses	6
9	Frame availability in Indian market	6
10	FAQ's by customers and their ideal answers	6
<b>Total</b>		<b>60 hrs</b>

### BOPT 433 P - Dispensing Optics(90 hrs)

Sr no	Topic
1	Transposition – Simple and Toric prescription
2	Measurement of Inter Pupillary Distance
3	Solving problems of vergence calculation
4	Use of lensometer for spherical lenses – Power and center marking
5	Solving problems on centration & decentration
6	Using Geneva Lens measure to find out surface power of lenses
7	Use of lensometer for finding out power of all type of lenses, marking – center, axis , measuring power of prism.
8	Marking – center, axis by other methods

9	Hand Neutralization of Ophthalmic lenses
10	Glazing cutting fitting for various type of lenses
11	Lens and Frame identification

**Text book/reference books:**

- Jalie MO: Ophthalmic lens and Dispensing, 3rd edition, Butterworth –Heinemann, 2008
- Troy E. Fannin, Theodore Grosvenor: Clinical Optics, 2nd edition, Butterworth –Heinemann, 1996
- C W Brooks, IM Borish: System for Ophthalmic Dispensing, 3rd edition, Butterworth - Heinemann, 2007
- Michael P Keating: Geometric, Physical & Visual Optics, 2nd edition, Butterworth –Heinemann, 2002

### BOPT 430T- Optometric Instrumentation

Sr. No.	Topics	No of hrs
1	Refractive instruments: Optotypes and MTF, Spatial Frequency,	4
2	Test charts standards, Choice of test charts, Trial case lenses, Refractor (phoropter) head units, Optical considerations of refractor units, Trial frame design, Near vision difficulties with units and trial frames,	8
3	Retinoscope – types available, Adjustment of Retinoscopes- special features, Objective optometers.,	5
4	Infrared optometer devices., Projection charts , Illumination of the consulting room., Brightness acuity test, Vision analyzer, Pupilometer, Potential Acuity Meter, Abberometer	8
5	Ophthalmoscopes and related devices :Design of ophthalmoscopes – illumination ,Design of ophthalmoscopes- viewing, Ophthalmoscope disc, Filters for ophthalmoscopy, Indirect ophthalmoscope	8
6	Lensometer, Lens gauges or clock	2
7	Slit lamp	1
8	Tonometers, Keratometer and corneal topography	3
	Refractometer	1
9	Orthoptic Instruments (Synaptophore Only), Color Vision Testing Devices Fields of Vision And Screening Devices, Scans	3
10	ERG	1
11	New Instruments	1
	<b>Total</b>	<b>45 hrs</b>

### BOPT 434 P - Optometric Instrumentation (30 hrs)

Sr. No.	Topics
1	Refractive instruments: Optotypes and MTF, Spatial Frequency(only theory),
2	Test charts standards
3	Retinoscope
4	Vision analyzer, Pupilometer, Potential Acuity Meter, Abberometer
5	Ophthalmoscopes and related devices
6	Lensometer, Lens gauges or clock
7	Slit lamp
8	Tonometers, Keratometer and corneal topography
	Refractometer

9	Orthoptic Instruments, Color Vision Testing Devices , Fields of Vision And Screening Devices , Scans
10	ERG

**Text book:**

David Henson: Optometric Instrumentations, Butterworth- Heinnemann, UK, 1991

**Reference books:**

- P R Yoder: Mounting Optics in Optical Instruments, SPIE Society of Photo- Optical Instrumentation, 2002
- G Smith, D A. Atchison: The Eye and Visual Optical Instruments, Cambridge University Press, 199

## BOPT 431 T –Basics &Ocular Pharmacology

Sr no.	Topics	No of hrs
1	General Pharmacology: Introduction & sources of drugs, Routes of drug administration, Pharmacokinetics (emphasis onocular pharmacokinetics), Pharmacodynamics & factors modifying drug actions	4
2	Systemic Pharmacology: Autonomic nervous system: Drugs affecting papillary size and light reflex, Intraocular tension,Accommodation; Cardiovascular system: Anti-hypertensives and drugs useful in Angina; Diuretics: Drugs used in ocular disorders; Central Nervous System: Alcohol, sedativehypnotics, General & local anesthetics, Opioids & non-opioids;Chemotherapy : Introduction on general chemotherapy,Specific chemotherapy –Antiviral, antifungal, antibiotics;Hormones : Corticosteroids, Antidiabetics; Blood Coagulants	4
3	Ocular Pharmacology: Ocular preparations, formulations and requirements of an ideal agent; Ocular Pharmacokinetics, methods of drug administration & Special drug delivery system; Ocular Toxicology	4
4	Diagnostic & Therapeutic applications of drugs used in Ophthalmology: Diagnostic Drugs & biological agents used in ocular surgery,	4
5	Anesthetics used in ophthalmic procedures,	2
6	Anti-glaucoma drugs;	2
7	Pharmacotherapy of ocular infections –Bacterial, viral, fungal & chlamydial;	3
8	Drugs used in allergic ,inflammatory& degenerative conditions of the eye;	3
9	Immune modulators in Ophthalmic practice, Wetting agents & tear substitutes ,	2
10	Antioxidants	2
	<b>Total</b>	<b>30 hrs</b>

### Text book/reference books:

- K D Tripathi: Essentials of Medical Pharmacology. 5th edition, Jaypee, New Delhi, 2004
- Ashok Garg: Manual of Ocular Therapeutics, Jaypee, New Delhi, 1996
- T J Zimmerman, K S Kooner : Text Book of Ocular Pharmacology, Lippincott-Raven, 1997

## Ability Enhancement Course

### AEC 003T - Computers and Applications

Sr no.	Topics	No of hrs
1	Introduction to computer: Introduction, characteristics of computer, block diagram of computer, generations of computer, computer languages.	1
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
3	Processor and memory: The Central Processing Unit (CPU), main memory.	4
4	Storage Devices: Sequential and direct access devices, magnetic tape, magnetic disk, optical disk, mass storage devices.	3
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.).	5
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.	5
7	Introduction to Excel: introduction, about worksheet, entering information, saving workbooks and formatting, printing the worksheet, creating graphs.	5
8	Introduction to power-point: introduction, creating and manipulating presentation, views, formatting and enhancing text, slide with graphs.	5
9	Introduction of Operating System: introduction, operating system concepts, types of operating system.	4
10	Computer networks: introduction, types of network (LAN, MAN, WAN, Internet, Intranet), network topologies (star, ring, bus, mesh, tree, hybrid), components of network.	5

11	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.	4
12	Application of Computers in clinical settings.	1
	Total	<b>45 hrs</b>

**Text books:**

- (1) Mausner&bahn : Epidemiology-An Introductory text, 2<sup>nd</sup> Ed.,W.B.Saunders Co.
- (2) Richard f. Morton & j. Richard hebd : A study guide to Epidemiology and Biostatistics, 2<sup>nd</sup> Ed., University Park Press, Baltimore.
- (3) Sylvia W Smoller, J Smoller, Biostatistics & Epidemiology A Primer for health and Biomedical professionals, 4<sup>th</sup> edition, Springs, 2015

## Ability Enhancement Course

### AEC 004T - Biostatistics and Research Methodology

Sr no.	Topics	No of hrs
1	Introduction to research methods	5
2	Identifying research problem	5
3	Ethical issues in research	5
4	Research design	5
5	Basic Concepts of Biostatistics	5
6	Types of Data	5
7	Research tools and Data collection methods	5
8	Sampling methods	5
9	Developing a research proposal	5
	Total	45 hrs

#### Text books:

- (1) Mausner & Bahn : Epidemiology-An Introductory text, 2<sup>nd</sup> Ed., W.B. Saunders Co.
- (2) Richard f. Morton & j. Richard Hebd : A study guide to Epidemiology and Biostatistics, 2<sup>nd</sup> Ed., University Park Press, Baltimore.
- (3) Sylvia W Smoller, J Smoller, Biostatistics & Epidemiology A Primer for health and Biomedical professionals, 4<sup>th</sup> edition, Springs, 2015



# THIRD YEAR

## B. Optometry

### SEMESTER-V

Code No.	Core Subjects
<b>Theory</b>	
BOPT 535T	Contact Lenses I
BOPT 536 T	Binocular Vision I&II
BOPT 537 T	Low Vision Aids
BOPT 538 T	Systemic Disease
BOPT 539CP	BOPT Directed Clinical Education-II
<b>Practical</b>	
BOPT540 P	Contact Lenses I
BOPT541 P	Binocular Vision I&II
<b>Core Elective Course</b>	
CEC 005 T	Basics of Clinical Skills Learning
CEC 006 T	Hospital Operation Management

## BOPT535 T - Contact Lenses I

Sr. No.	Topics	No. of Hrs.
1	<b>Introduction to Contact lenses-</b> Definition, Classification / Types	3
2	History of Contact Lenses	2
3	<b>Optics of Contact Lenses-</b> Magnification & Visual field, Accommodation & Convergence, Back & Front Vertex Power / Vertex distance calculation	3
4	<b>Review of Anatomy &amp; Physiology of-</b> Tear film,Cornea,Lids& Conjunctiva	2
5	<b>Introduction to CL materials-</b> Monomers, Polymers	2
6	<b>Properties of CL materials-</b> Physiological (Dk, Ionicity, Water content),Physical (Elasticity, Tensile strength, Rigidity), Optical (Transmission, Refractive index)	3
7	Indications and contraindications	2
8	Parameters / Designs of Contact Lenses & Terminology	2
9	RGP Contact Lens materials	2
10	Manufacturing Rigid and Soft ContactLenses –various methods	2
11	Pre-Fitting examination –steps, significance, recording of results	2
12	Correction of Astigmatism with RGP lens	2
13	Types of fit –Steep, Flat, Optimum –on spherical cornea with spherical lenses	2
14	Types of fit –Steep, Flat, Optimum –on Toric cornea with spherical lenses	2
15	Calculation and finalizing Contact lens parameters	2
16	Ordering Rigid Contact Lenses –writing a prescription to the Laboratory	1
17	Checking and verifying Contact lenses from Laboratory	2
18	Modifications possible with Rigid lenses	2
19	<b>Common Handling Instructions-</b> Insertion & Removal Techniques, Do's and Dont's	2
20	<b>Care and Maintenance of Rigid lenses -</b> Cleaning agents & Importance, Rinsing agents & Importance, Disinfecting agents & importance, Lubricating & Enzymatic cleaners	2
21	Follow up visit examination	1
22	Complications of RGP lenses	2
<b>Total</b>		<b>45 hrs</b>

## BOPT540P - Contact Lenses I

Sr. No.	Topics	No. of Hrs.
1	Preliminary measurements and slit Lamp	30 hrs
2	Keratometry	
3	Fitting Philosophies	
4	Handling instructions	
5	Care and maintenance	
<b>Total</b>		<b>30 hrs</b>

### Recommended Learning Resources

#### Text Books:

- IACLE modules 1 - 10
- CLAO Volumes 1, 2, 3
- Anthony J. Phillips : Contact Lenses, 5<sup>th</sup> edition, Butterworth-Heinemann, 2006
- Elisabeth A. W. Millis: Medical Contact Lens Practice, Butterworth-Heinemann, 2004
- E S. Bennett ,V A Henry :Clinical manual of Contact Lenses, 3<sup>rd</sup> edition, Lippincott Williams and Wilkins, 2008

Reference books or related websites: [www.iacle.org](http://www.iacle.org)

## BOPT 536 T- Binocular Vision I & II

Sr. No.	Topics	No. of Hrs.
1	<b>Binocular Vision and Space perception-</b> Relative subjective visual direction., Retino motor value, Grades of BSV, SMP and Cyclopean Eye, Correspondence, Fusion, Diplopia, Retinal rivalry, Horopter, Physiological Diplopia and Suppression, Stereopsis, Panum's area, BSV, Stereopsis and monocular clues – significance, Egocentric location, clinical applications, Theories of Binocular vision.	6
2	<b>Anatomy of Extra Ocular Muscles-</b> Rectii and Obliques, LPS, Innervation & Blood Supply, Physiology of Ocular movements, Center of rotation, Axes of Fick, Action of individual muscle, Laws of ocular motility, Donders' and Listing's law, Sherrington's law, Hering's law, Uniocular & Binocular movements - fixation, saccadic & pursuits, Version & Vergence., Fixation & field of fixation	4
3	<b>Near Vision Complex Accommodation-</b> Definition and mechanism ,(process), Methods of measurement, Stimulus and innervation, Types of accommodation, Anomalies of accommodation –aetiology and management.	3
4	<b>Convergence-</b> Definition and mechanism, Methods of measurement, Types and components of, convergence - Tonic, accommodative, fusional, proximal, Anomalies of Convergence –aetiology and management.	4
5	Sensory adaptations Confusion	3
6	Suppression Investigations, Management Blind spot syndrome	2
7	Abnormal Retinal Correspondence, Investigation and management, Blind spot syndrome	3
8	Eccentric Fixation, Investigation and management	3
9	<b>Amblyopia Classification:</b> Aetiology, Investigation, Management	3
10	Neuro-muscular anomalies: Classification and etiological factors	2
11	History –recording and significance.	3
11	<b>Convergent strabismus-</b> Accommodative convergent squint : Classification , Investigation and Management, Non accommodative Convergent squint : Classification , Investigation and management	3
12	Divergent Strabismus : Classification, A& V phenomenon , Investigation and ,Management	3
13	Vertical strabismus : Classification , Investigation and, Management	2
14	<b>Paralytic Strabismus : Acquired and Congenital-</b> Clinical Characteristics, Distinction from comitant and restrictive Squint	3
15	<b>Investigations-</b> History and symptoms, Head Posture, Diplopia Charting , Hess chart, PBCT, Nine directions, Binocular field of vision	5

16	Nystagmus	2
17	Surgical and Non-surgical Management of Squint	2
18	<b>Restrictive Strabismus</b> – Features- Musculo facial anomalies, Duane’s Rétraction syndrome, Clinical features and management, Brown’s Superior oblique sheath syndrome, Strabismus fixus, Congenital muscle fibrosis	4
<b>Total</b>		<b>60 hrs</b>

### BOPT541 P - Binocular Vision I & II

Sr. No.	Topics	No. of Hrs.
1	Examination of status of binocular vision – W.F.D.T, Maddox rod, wing, Accommodation, vergences	30 hrs
2	Type of Cover Test, ocular movement, diplopia charting	
<b>Total</b>		<b>30 hrs</b>

#### Recommended Learning Resources:

##### Text Books:

- Pradeep Sharma: Strabismus simplified, New Delhi, First edition, 1999, Modern publishers.
- Fiona J. Rowe: Clinical Orthoptics, second edition, 2004, Blackwell Science Ltd
- Gunter K. Von Noorden: BURIAN- VON NOORDEN’S Binocular vision and ocular motility theory and management of strabismus, Missouri, Second edition, 1980, C. V. Mosby Company
- Mitchell Scheiman; Bruce Wick: Clinical Management of Binocular Vision Heterophoric, Accommodative, and Eye Movement Disorders, 2008, Lippincot Williams & Wilkins publishers

## BOPT 537 T- Low Vision Aids

Sr. No.	Topics	No. of Hrs.
1	Definitions & classification of Low vision	2
2	Epidemiology of low vision, Model of low vision service	2
3	Pre-clinical evaluation of low vision patients –prognostic & psychological factors; psycho-social impact of low vision	2
4	Clinical evaluation –assessment of visual acuity, visual field, selection of low vision aids, instruction & training	2
5	Optics of Low vision devices	2
6	Types of low vision devices –optical aids, non-optical aids & electronic devices	3
7	Pediatric Low Vision care and Special children	3
8	Low vision aids –dispensing & prescribing aspects	3
9	<b>Management of Field loss in Low vision</b> - Eccentric viewing Training, Prescription of Prisms	3
10	Visual rehabilitation & counseling	2
11	Legal aspects of Low vision in India	2
12	Case Analysis	4
<b>Total</b>		<b>30 hrs</b>

### Recommended Learning Resources:

#### Text Books:

1. Christine Dickinson: Low Vision: Principles and Practice Low vision care, 4<sup>th</sup> edition, Butterworth-Heinemann, 1998
2. E Vaithilingam: practice of Low vision –A guide book, Medical Research Foundation, 2000.
3. Richard L. Brilliant: Essentials of Low Vision Practice, Butterworth-Heinemann, 1999
4. Helen Farral: optometric Management of Visual Handicap, Blackwell Scientific publications, 1991
5. A J Jackson, J S Wolffsohn: Low Vision Manual, Butterworth Heinnemann, 2007

## BOPT 538 T- Systemic Diseases

Sr. No.	Topics	No. of Hrs.
1	<b>Hypertension</b> -Definition, classification, Epidemiology, clinical examination, complications, and management, Hypertensive retinopathy	2
2	<b>Diabetes Mellitus</b> -Classification, pathophysiology, clinical presentations, diagnosis, and management, Complications: Diabetic Retinopathy	2
3	<b>Thyroid Disease</b> - Physiology, testing for thyroid disease, Hyperthyroidism, Hypothyroidism, Thyroiditis, Thyroid tumors; Grave's Ophthalmopathy	2
4	<b>Acquired Heart Disease</b> - Ischemic Heart Disease, Congestive heart failure, Disorders of cardiac rhythm, Ophthalmic considerations	2
5	<b>Cancer</b> :Incidence, Etiology, Therapy, Ophthalmologic considerations	2
6	<b>Connective Tissue Disease</b> - Rheumatic arthritis, Systemic lupus erythematosus, Scleroderma, Polymyositis and dermatomyositis, Sjogren syndrome, Behcet's syndrome, Eye and connective tissue disease	2
7	<b>Tuberculosis</b> - Aetiology, pathology, clinical features, pulmonary tuberculosis, diagnosis, complications, treatment tuberculosis and the eye.	2
8	Herpes virus ( Herpes simplex, Varicella Zoster, Cytomegalovirus, Epstein Barr Virus)Herpes and the eye	4
9	Hepatitis ( Hepatitis A, B, C)	2
10	Acquired Immunodeficiency Syndrome	4
11	Anemia ( Diagnosis, clinical evaluation, consequences, Sickle cell disease, treatment, Ophthalmologic considerations)	3
12	<b>Common Tropical Medical Ailment</b> - Malaria, Typhoid, Dengue, Filariases, Onchocerciasis, Cysticercosis, Leprosy	3
13	<b>Nutritional and Metabolic disorders</b> :Obesity, Hyperlipidaemias, Kwashiorkor, Vitamin A Deficiency, Vitamin D Deficiency, Vitamin E Deficiency, Vitamin K Deficiency, Vitamin B1,B2, Deficiency, Vitamin C Deficiency,	3
14	Myasthenia Gravis	2
15	First Aid, General Medical Emergencies, Preoperative precautions in ocular surgeries	2
16	<b>Psychiatry</b> - Basic knowledge of psychiatric condition andPatient Management	2
17	<b>Genetics</b> - Introduction to genetics, Organisation of the cell, Chromosome structure and cell division, Gene structure and basic principles of Genetics, Genetic disorders and their diagnosis, Genes and the eye, Genetic counseling and genetic engineering.	3
<b>Total</b>		<b>45 hrs</b>

**Reference books or related websites:**

**Recommended Learning Resources:**

**Text Books:**

- a. C Haslett, E R Chilvers, N A boon, N R Coledge, J A A Hunter:  
Davidson's Principles and Practice of Medicine, Ed. John Macleod, 19th  
Ed., ELBS/Churchill Livingstone. (PPM), 2002
- b. Basic and clinical Science course: Update on General Medicine, American  
Academy of Ophthalmology, Section 1, 1999



**BOPT 539CP - Community Orientation & Clinical Visit (including related practical's to the parent course) (Total -405 hrs.)**

## CORE ELECTIVE COURSES

<b>Name of the Programme</b>	<b>B. Optometry</b>
<b>Name of the Course</b>	<b>Basics of Clinical Skill Learning</b>
<b>Course Code</b>	<b>CEC 005 T</b>

Sr. No.	Topics	No. of Hrs.
1	<b>MEASURING VITAL SIGNS:</b> Temperature: Axillaries Temperature, Pulse: Sites of pulse, Measurement, Respiratory, Blood Pressure, Pain: Pain Scale	5
2	<b>PHYSICAL EXAMINATION:</b> Observation, Auscultation(Chest), Palpation, Percussion, History Taking	10
3	<b>FEEDING: ENTRAL FEEDING, NG TUBE:</b> Measurement, Procedure, Care, Removal of Nasal-Gastric Tube, Nasal-Gastric Tube Feeding, and Parental Nutrition.	10
4	<b>ADMINISTRATIONS:</b> Oral, Intravenous, Intramuscular, Subcutaneous, Recapping of Syringe, Loading of Drugs, Calculation of Drugs, Venipuncture, IV Infusion, Cannula, Attachment of IV infusion Set, Fluid Collection, Heparin Lock, Maintenance of IV set, Performing Nebulizer Therapy, Inhaler, Oxygen Therapy (Nasal, prongs, nasal Catheter,Venturi Mask, face mask)	10
5	<b>ASEPSIS:</b> Hand wash Techniques,(Medical, Surgical) Universal Precaution, Protecting Equipments: Using Sterile Gloves, Opening a Sterile package and Establishing a Sterile Field, Sterile Dressing Changes, Surgical Attire ,Wound Dressing, Suture Removal, Cleaning and Application of Sterile Dressing, Wearing and Removal of personal protective Equipment	5
6	<b>MOBILITY AND SUPPORT:</b> Moving and Positioning, range of Motion exercises (Active & Passive) Assisting for Transfer, Application of Restraints	5
<b>Total</b>		<b>45 hrs</b>

<b>Name of the Programme</b>	<b>B. Optometry</b>
<b>Name of the Course</b>	<b>Hospital Operation Management</b>
<b>Course Code</b>	<b>CEC 006 T</b>

<b>Sr. No.</b>	<b>Topics</b>	<b>No. of Hrs.</b>
1	<b>MEDICO-LEGAL CASES:</b> Introduction, Laws associated with Medico-Legal Cases, Three Core Contents in Medico-legal cases w.r.t Doctors, Patient & Profession,	5
2	<b>CONSIDERATIONS OF ETHICS:</b> Consent, Confidentiality, Mental Health, End of life and Organ Transportation, Research & Clinical Trials	10
3	<b>HOSPITAL INFORMATION SYSTEM(HIS):</b> Hospital Information System Management, software applications in registration, billing, investigations, reporting, medical records management, Security and ethical challenges	10
4	<b>EQUIPMENT OPERATIONS MANAGEMENT:</b> Hospital equipment repair and maintenance, types of maintenance, job orders, equipment maintenance log books, AMCS	10
5	<b>ROLE OF MEDICAL RECORDS IN HEALTH CARE MANAGEMENT:</b> Computers for Medical records, Developments of computerized medical record information processing system(EMR's), Computer stored (Vs) Manual hand written record, Advantages of EMR (Vs) Manual	10
<b>Total</b>		<b>45 hrs</b>

# THIRD YEAR

## B.Optomety

### SEMESTER-VI

Code No.	Core Subjects
<b>Theory</b>	
BOPT642 T	Contact Lenses II
BOPT643 T	Sports Vision
BOPT644 T	Pediatric and Geriatric Optometry
BOPT645 T	Occupational Optometry
BOPT646 CP	BOPTOM Directed Clinical Education-III
<b>Practical</b>	
BOPT647 P	Contact Lenses II
BOPT648 P	Pediatric and Geriatric Optometry

## BOPT 642 T- Contact Lenses II

Sr. No.	Topics	No. of Hrs.
1	SCL Materials & Review of manufacturing techniques	2
2	Comparison of RGP vs. SCL	1
3	Pre-fitting considerations for SCL	2
4	Fitting philosophies for SCL	3
5	Fit Assessment in Soft Contact lenses :Types of fit –Steep, Flat, Optimum	3
6	Calculation and finalizing SCL parameters	2
7	Modalities of Soft contact lenses available and their advantages	2
8	<b>Soft Toric CL-</b> Stabilization techniques, Parameter selection, Fitting assessment,	2
9	Common Handling Instructions, Insertion & Removal Techniques, Do's and Dont's	1
10	<b>Care and Maintenance of Soft lenses</b> - Cleaning agents & Importance, Rinsing agents & Importance, Disinfecting agents & importance, Lubricating & Enzymatic cleaners	2
11	Follow up visit examination	2
12	Complications of Soft lenses	3
13	<b>Therapeutic contact lenses-</b> Indications, Fitting consideration	1
14	<b>Specialty fitting:</b> Aphakia, Pediatric, Post refractive surgery	2
15	Management of Presbyopia with Contact lenses	2
<b>Total</b>		<b>30 hrs</b>

## BOPT 647 P -Contact Lenses II

Sr. No.	Topics	No. of Hrs.
1	Preliminary measurements and slit Lamp	30 hrs
2	Keratometry	
3	Fitting Philosophies	
4	Handling instructions	
5	Care and maintenance	
<b>Total</b>		<b>30 hrs</b>

**Recommended Learning Resources:**

**Text Books:**

- IACLE modules 1 - 10
- CLAO Volumes 1, 2, 3
- Anthony J. Phillips : Contact Lenses, 5<sup>th</sup> edition, Butterworth-Heinemann, 2006
- Elisabeth A. W. Millis: Medical Contact Lens Practice, Butterworth-Heinemann, 2004
- E S. Bennett ,V A Henry :Clinical manual of Contact Lenses, 3<sup>rd</sup> edition, Lippincott Williams and Wilkins, 2008

**Reference books or related websites: [www.iacle.org](http://www.iacle.org)**

## BOPT 643 T- Sports Vision

Sr. No.	Topics	No. of Hrs.
1	Principles of Vision Training	2
2	<b>Introduction to Sports Vision-</b> History of Sports Vision, Definitions of Terms	2
3	<b>Vision and Sports-</b> Vision Performance and Athletics	2
4	Equipment List	2
5	Sports Terminologies	2
6	<b>Sports Vision Examinations-</b> Visual Acuity, High Contrast, Refraction, Color Vision, Stereopsis, Dominant Eye / Hand, Eye Health, Cover Test, Ocular Motility, Visual Field, Night Vision, Glare Sensitivity, Glare Recovery	4
7	<b>Visual Skills Description and Training Procedures-</b> Accommodation – Vergence Facility, Distance Fixation Disparity, Dynamic Visual Acuity, Eye-Hand Co-ordination, Response Speed, Eye-Foot Co-ordination, Response Speed, Eye-Foot-Body Balance, Peripheral Awareness, Anticipation Timing, Visual Concentration, Speed of Recognition, Visual Concentration, Speed of Recognition, Visual Adjustability, Peripheral Reaction Time, Visualization, Speed of Focusing, Increased Fusional Reserve, Fixation Ability, Visual Memory, Spatial Localization	4
8	Visual Skills in Sports and Prescription in the form of vision correction	3
9	Designing Sports Vision Programs	2
10	Sports-related Injuries and First Aid	3
11	Post trauma vision syndrome and Visual Midline Shift Syndrome	2
12	Special Concerns Dyslexia, Down's Syndrome	2
13	<b>Orthoptic Evaluation-</b> Identification of sports eye wear for various sports Identification of sports protective devices, Dispensing of various kinds of sports eyewear.	
<b>Total</b>		<b>30 hrs</b>

### Recommended Learning Resources:

#### Text Books:

Sports Vision by DFC Loran and C J MacEwen Publishers: Butterworth and Heinmann

Reference books or related websites:

Sports Vision by Graham Erickson Publishers: Butterworth and Heinmann

## BOPT 644 T- Pediatric and Geriatric Optometry

Sr. No.	Topics	No. of Hrs.
1	Structural , and morphological changes of eye in elderly	1
2	Physiological changes in eye in the course of aging.	1
3	Introduction to geriatric medicine –epidemiology , need for optometry care, systemic diseases (Hypertension, Atherosclerosis, coronary heart disease, congestive Heart failure, Cerebrovascular disease, Diabetes, COPD)	1
4	Optometric Examination of the Older Adult	1
5	Ocular diseases common in old eye, with special reference to cataract, glaucoma, macular disorders, vascular diseases of the eye	1
6	Contact lenses in elderly	1
7	Pharmacological aspects of aging	1
8	Low vision causes, management and rehabilitation in geriatrics.	1
9	Spectacle dispensing in elderly –Considerations of spectacle lenses and frames	1
10	The Development of Eye and Vision	1
11	History taking Pediatric subjects	1
12	Assessment of visual acuity	2
13	<b>Normal appearance, pathology and structural anomalies of-</b> a) Orbit, Eye lids, Lacrimal system,b) Conjunctiva, Cornea, Sclera Anterior chamber, Uveal tract, Pupil, c) Lens, vitreous, Fundus Oculomotor system	2
14	Refractive Examination	2
15	Determining binocular status	1
16	Determining sensory motor adaptability	1
17	Compensatory treatment and remedial therapy for : Myopia, Pseudomyopia, Hyperopia, Astigmatism, Anisometropia, Amblyopia	2
18	Remedial and Compensatory treatment of Strabismus and Nystagmus	1
19	Pediatric eye disorders : Cataract, Retinopathy of Prematurity, Retinoblastoma, Neuromuscular conditions (myotonic dystrophy, mitochondrial cytopathy), and Genetics	2
20	Anterior segment dysgenesis, Aniridia, Microphthalmos, Coloboma, Albinism	2



21	Spectacle dispensing for children	1
22	Pediatric contact lenses	1
23	Low vision assessment in children	1
24	The Development of Eye and Vision	1
<b>Total</b>		<b>30 hrs</b>

### **BOPT 648 P -Pediatric and Geriatric Optometry**

Sr. No.	Topics	No. of Hrs.
1	Comprehensive Pediatric Case Work up	<b>30 hrs</b>
2	Comprehensive geriatric Case work up	
3	Diagnostic techniques for pediatric cases	
4	Dispensing of eyewear for various age groups of 0-16 years	
5	Dispensing of eyewear for geriatric population	
<b>Total</b>		<b>30 hrs</b>

**Text Books:**

- Pediatric Optometry - JEROME ROSNER, Butterworth, London 1982
- William Harvey/ Bernard Gilmartin, Butterworth –Heinemann, 2004
- Binocular Vision and Ocular Motility - VON NOORDEN G K Burian Von Noorden's, 2nd Ed., C.V.Mosby Co. St. Louis, 1980.
- Assessing Children's Vision. By Susan J Leat, Rosalyn H Shute, Carol A Westall.45 Oxford: Butterworth-Heinemann, 1999.
- Clinical pediatric optometry. LJ Press, BD Moore, Butterworth- Heinemann, 1993
- A.J.ROSSENBLROOMJr&M.W.MORGAN:VisionandAging,Butterworth-Heinemann, Missouri,2007.
- OP Sharma: Geriatric Care –A textbook of geriatrics and Gerontology, viva books, New Delhi, 2005
- VS Natarajan: An update on Geriatrics, SakthiPathipagam, Chennai, 1998
- DE Rosenblatt, VS Natarajan: Primer on geriatric Care A clinical approach to the older patient, Printers Castle, Cochin, 2002

## BOPT645T- Occupational Optometry

Sr. No.	Topics	No. of Hrs.
1	Introduction to Occupational health, hygiene and safety, international bodies like ILO, WHO, National bodies etc Acts and Rules - Factories Act, WCA, ESI Act	4
2	Electromagnetic Radiation and its effects on Eye	3
3	Light –Definitions and units, Sources, advantages and disadvantages, standards	3
4	Color –Definition, Color theory, Color coding, Color defects, Color Vision tests	2
5	Occupational hazards and preventive/protective methods	3
6	Task Analysis	3
7	Industrial Vision Screening –Modified clinical method and Industrial Vision test	3
8	Vision Standards –Railways, Roadways, Airlines	3
9	Visual Display Units	3
10	Contact lens and work	3
<b>Total</b>		<b>30 hrs</b>

### Recommended Learning Resources:

#### Text Books:

- G W Good: Occupational Vision Manual available in the following website: [www.aoa.org](http://www.aoa.org)
- N.A. Smith: Lighting for Occupational Optometry, HHSC Handbook Series, Safchem Services, 1999
- J Anshel: Visual Ergonomics Handbook, CRC Press, 2005
- G Carson, S Doshi, W Harvey: Eye Essentials: Environmental & Occupational Optometry, Butterworth-Heinemann, 2008

**BOPT646CP - Community Orientation & Clinical Visit (including related practical's to the parent course) (Total -540 hrs.)**

## **INTERNSHIP**

### **Guidelines:**

1. The internship shall commence after the student has completed and passed all subjects up to VI semesters.
2. The internship is compulsory.
3. The duration of the internship shall be one year.
4. The degree of Bachelor in Allied Health Sciences shall be awarded after the satisfactory completion of the internship.

### **Evaluation of Internees:**

#### **Formative Evaluation:**

Day to day assessment of the internees during their internship postings should be done by the Head of the Department/Faculty assigned. The objective is that all the interns must acquire necessary minimum skills required for carrying out day to day professional work competently. This can be achieved by maintaining Records /Log Book by all internees. This will not only provide a demonstrable evidence of the processes of training but more importantly of the internee's own acquisition of competence as related to performance.

#### **Summative Evaluation:**

It shall be based on the observation of the Sr. Technical staff / Faculty of the department concerned and Record / Log book maintained by the interns. Based on these two evaluations, the Head of the Department shall issue certificate of satisfactory completion of training, following which the university shall award the degree or declare him/her eligible for it.

To implement the project work uniformly for all the specialties in view of the curriculum and training to be acceptable internationally and the students to get opportunity for higher studies and employment.

### **Internship Programme:**

- 05 days for orientation programme
- 300 days in Ophthalmic Dept.
- 15 days in Pharmacology Dept.
- 30 days in Eye Bank
- 15 days in Community Medicine Dept.

**Resolution No. 4.5.1 of BOM-53/2018:**

It was accepted to keep 50% as the passing marks for all the elective and core subjects for UG courses under School of Biomedical Sciences.

**Resolution No. 4.13 of BOM-55/2018: Resolved as follows:-**

- (i) Slow learners must be re-designated as potential learners.
- (ii) Students scoring less than 35% marks in a particular subjects/course in the 1<sup>st</sup> formative exam are to be listed as potential learners. These learners must be constantly encouraged to perform better with the help of various remedial measures.
- (iii) Students scoring more than 75% marks in a particular subjects/course in the 1<sup>st</sup> formative exam are to be listed as advanced learners. These learners must be constantly encouraged to participate in various scholarly activities.

**Resolution No. 3.2.1.6.e of BOM-57/2019:** Resolved to approve the List of books (PG) for M.Sc. Clinical Nutrition and List of books (UG & PG) for Optometry program. [Annexure-27 & 28]

## Annexure-28

### List Of the book for Optometry Course

Sr no	Name of the book	Course	Type of Book
1	A text book of Optics	B Optometry	Text book
2	Geometric, Physical and Visual Optics	B Optometry	Reference Book
3	Clinical visual Optics	B Optometry	Text book
4	Sports Vision: Vision Care for the Enhancement of Sports Performance	B Optometry	Text book
5	Environmental & Occupational Optometry	B Optometry	Reference Book
6	Theory and Practice of Optics and Refraction	B Optometry	Text book
7	System for Ophthalmic Dispensing	B Optometry	Text book
8	Optometric Instrumentations	B Optometry	Text book
9	Geometrical and Visual Optics: A Clinical Introduction	B Optometry/ M Optometry	Text book
10	Borish's clinical refraction	B Optometry/ M Optometry	Text book
11	Primary Care Optometry	B Optometry/ M Optometry	Text book
12	Clinical Procedures in Primary Eye Care	B Optometry/ M Optometry	Reference Book
13	Ophthalmic lens and Dispensing	B Optometry	Text book
14	Clinical Optics	B Optometry	Text book
15	Contact Lenses	B Optometry / M Optometry	Text book
16	Clinical Management of Binocular Vision: Heterophoric, Accommodative, and Eye Movement Disorders	M Optometry	Text book
17	Essentials of Low Vision Practice	M Optometry	Text book



**Resolution No. 3.2.1.6.f of BOM-57/2019:** Resolved to amend provision for grade points for 4<sup>th</sup> semester for Optometric Optics subject (IA of 50 marks) in the curriculum for B. Optometry, Batch admitted in 2017-18 (old CBCS pattern) and 2018-19 onwards (new CBCS pattern). [Annexure-29]



## **MGM SCHOOL OF BIOMEDICAL SCIENCES, NAVI MUMBAI**

(A constituent unit of MGM INSTITUTE OF HEALTH SCIENCES)

(Deemed University u/s 3 of UGC Act 1956)

Grade "A" Accredited by NAAC

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### **Annexure-29**

MGM/SBS/Opto/2019/48

Date -29/03/2019

To,  
Registrar,  
MGMIHS  
Kamothe

#### **Through Proper Channel**

**Subject: Amendment of Internal marks for B. Optometry for batch 2017-18 and 2018-19**

Dear Sir,

This is with reference to the above subject, it has come to our notice that there are no marks allotted for practical examination to the Optometric Instrumentation in the 4<sup>th</sup> semester and only credits have been mentioned. In absence of marks we cannot give credit to the student for that particular subject in the Mark sheet.

#### **Existing resolution / Decision / Order related to the above item:**

BOM – 53/2018, Resolution no.4.4.2 dated 19/05/2018 and BOM 52/2018, Resolution no. 3.10.2, dated 13/01/2018(Semester III & IV).

This is requested to amend provision for grade points for 4th semester for Optometric Optics subject (IA of 50 marks), in the curriculum for B Optometry, Batch 2017-18 and 2018 -19.

Thanking You,

Yours Sincerely

Vidula Patil  
Coordinator  
Department Of Optometry  
MGMSBS, Kamothe

**Resolution No. 4.3.1.6 of BOM-63/2021:** Resolved to accord post facto approval for the changes in the subject name from Optometric Optics to Optometric Instrumentation (IA of 50 marks) in Semester IV in the curriculum of B.Optomety, batch admitted in 2017-18 (old CBCS pattern) and 2018-19 onwards (new CBCS pattern) in the index of B. Optometry Semester 4.



# MGM INSTITUTE OF HEALTH SCIENCES

(Deemed to be University u/s 3 of UGC Act, 1956)

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