



KAZI NAZRUL UNIVERSITY
School of Health Science and Technology
Department of Allied Health Science and Technology
UG Learning Outcome Based Curriculum (LOCF) for Bachelor of Optometry

Semester I

| Course Code | Course Name | L - T - P | Credits | Total Marks |
|--------------------|--------------------------------|------------------|----------------|--------------------|
| BOPC101 | Human Anatomy | 4-0-0 | 4 | 100 |
| BOPC102 | Human Anatomy Practical | 0-0-4 | 2 | 100 |
| BOPC103 | Human Physiology | 4-0-0 | 4 | 100 |
| BOPC104 | Human Physiology Practical | 0-0-4 | 2 | 100 |
| BOPC105 | Physical Optics | 4-0-0 | 4 | 100 |
| BOPC106 | Physical Optics Practical | 0-0-4 | 2 | 100 |
| AECC101 | Computer Application | 4-0-0 | 4 | 100 |
| AECC102 | Computer Application Practical | 0-0-4 | 2 | 100 |
| AECC103 | English Communication | 3-0-0 | 3 | 100 |
| TOTAL | | | 27 | 900 |



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Course Name: Human Anatomy
Course Code: BOPC101

| | | | | | |
|------------------------------------|----------------------|-----------|------------------|-----------|-------------|
| Course Type: Core (Theoretical) | Course Details: CC-1 | | L-T-P: 4 - 0 - 0 | | |
| Credit: 4 | Full Marks: 100 | CA Marks | | ESE Marks | |
| | | Practical | Theoretical | Practical | Theoretical |
|  |  | .... | 30 | .... | 70 |

Course Learning Outcomes:

1. Comprehend the normal disposition, inter-relationships, gross, functional and applied anatomy of various structures in the human body.
2. Identify the microscopic structures of various tissues, and organs in the human body and correlate the structure with the functions.
3. Comprehend the basic structure and connections between the various parts of the central nervous system so as to analyze the integrative and regulative functions on the organs and systems.

| Module | Topics | No. of Lectures |
|----------|--|-----------------|
| Module 1 | Introduction to Human Anatomy: Anatomy: Definition and its relevance Planes of the body, relationship of structures, organ system | 4 |
| Module 2 | Skeleton System: Structure, Functions | 4 |
| Module 3 | Tissues of the Body: Epithelium, connective tissue, bone and cartilage, Embryology, histology, different types of each of them, types of cells, cellular differentiation and arrangements in different tissues | 6 |
| Module 4 | Muscles: Different types of muscles, their functional differentiation, their relationship with different structures, their neural supply | 4 |
| Module 5 | Blood vessels: Differentiation between arteries and veins, embryology, histology of both arteries and veins, Functional differences between the two, anatomical differences at different locations | 6 |



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| | | |
|----------------------------------|--|---|
| Module 6 | Skin and appendages: Embryology, anatomical differences in different areas, functional and protective variations, innervations, relationship with muscles and nerves | 4 |
| Module 7 | Lymphatic system: Embryology, functions, relationship with blood vessels and organs | 4 |
| Module 8 | Glands: Embryology, different types of glands (exocrine and endocrine), functional differences, neural control of glands | 4 |
| Module 9 | Nervous system: Parts of Nervous system, cell types of nervous system, Blood-brain barrier, Reflex arc, Peripheral Nerves, Spinal nerves, Nerve fibers, Autonomic Nervous system | 6 |
| Module 10 | Brain and Cranial nerves: Major parts of Brain, Protective coverings of the Brain, Cerebrospinal Fluid, Brain stem, Cerebellum, Diencephalon, Cerebrum, Cranial nerves | 6 |
| Total Number of Hours= 48 | | |

Text Books:-

1. MARIANO S.H. DIFIORE: Atlas of Human Histology, 5th Ed. 1981, Lea and Feliger.
2. B.D. CHAURASIA: Handbook of General Anatomy, 2nd Ed., CBS Publishers and Distributors, New Delhi - 110 032.

Reference Books:-

1. PETER L. WILLIAMS AND ROGER WARWICK: - Gray's Anatomy - Descriptive and Applied, 36th Ed., 1980, Churchill Livingstone.
 2. R. KANAGASUNTHARAM, P. SIVANANDA-SINGHAM & A. KRISHNAMURTI: Anatomy- Regional, Functional, & Clinical, P.G. Publisher, Singapore 1987.
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Course Name: Human Anatomy Practical
 Course Code: BOPC102

| | | | | | |
|----------------------------------|----------------------|-----------|------------------|-----------|-------------|
| Course Type: Core (Practical) | Course Details: CC-2 | | L-T-P: 0 - 0 - 4 | | |
| Credit: 4 | Full Marks: 100 | CA Marks | | ESE Marks | |
| | | Practical | Theoretical | Practical | Theoretical |
| | | 60 | ---- | 40 | ---- |

Course Learning Outcomes:

1. Utilize compound microscope to perform microscopic study of epithelial, connective, muscular and nervous tissue.
2. Identify axial and appendicular bones of human body.
3. Practice use of Hemocytometer for enumeration of white blood cell (WBC) and red blood corpuscles (RBC).
4. Estimate bleeding time, clotting time, hemoglobin content and erythrocyte sedimentation rate (ESR).
5. Identify blood group, determine heart rate, pulse rate and record blood pressure.

| Module | Topics | No. of Practical D + P* |
|----------------------------------|--|----------------------------|
| Module 1 | Study of compound microscope | 2 + 2 |
| Module 2 | Identification of muscular and nervous system | 4 + 4 |
| Module 3 | Identification of axial bones Identification of appendicular bones | 4 + 4 |
| Module 4 | Introduction to hemocytometry | 2 + 2 |
| Module 5 | Enumeration of white blood cell (WBC) count Enumeration of total red blood corpuscles (RBC) count | 4 + 4 |
| Module 6 | Determination of bleeding time Determination of clotting time | 2 + 2 |
| Module 7 | Determination of blood group. Determination of erythrocyte sedimentation rate (ESR). | 4 + 4 |
| Module 8 | Determination of heart rate and pulse rate Recording of blood pressure | 2 + 2 |
| Total Number of Hours= 48 | | |

* D - Demonstration & P - Practice



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Text Books:-

1. MARIANO S.H. DIFIORE: Atlas of Human Histology, 5th Ed. 1981, Lea and Feliger.
2. B.D. CHAURASIA: Handbook of General Anatomy, 2nd Ed., CBS Publishers and Distributors, New Delhi - 110 032.

Reference Books:-

1. PETER L. WILLIAMS AND ROGER WARWICK: - Gray's Anatomy - Descriptive and Applied, 36th Ed., 1980, Churchill Livingstone.
2. R. KANAGASUNTHARAM, P. SIVANANDA-SINGHAM & A. KRISHNAMURTI: Anatomy- Regional, Functional, & Clinical, P.G. Publisher, Singapore 1987.

Course Name: Human Physiology
Course Code: BOPC103

| | | | | | |
|------------------------------------|----------------------|-----------|------------------|-----------|-------------|
| Course Type: Core (Theoretical) | Course Details: CC-3 | | L-T-P: 4 - 0 - 0 | | |
| Credit: 4 | Full Marks: 100 | CA Marks | | ESE Marks | |
| | | Practical | Theoretical | Practical | Theoretical |
|  |  | .... | 30 | .... | 70 |

Course Learning Outcomes:

1. Explain the normal functioning of various organ systems of the body and their interactions.
2. Elucidate the physiological aspects of normal growth and development.
3. Describe the physiological response and adaptations to environmental stresses.
4. Know the physiological principles underlying pathogenesis of disease.



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| Module | Topics | No. of Lectures |
|----------|--|-----------------|
| Module 1 | <p>CELL STRUCTURE & ORGANIZATION</p> <p>Tissue organization Epithelium Connective tissue –Collagen fibers –Elastic fibers – Areolar fibers Cartilage –Bone Contractile tissue –striated –skeletal –cardiac –non striated – plain – myoepithelial General principles of cell physiology Physiology of skeletal muscle</p> | 6 |
| Module 2 | <p>BLOOD:</p> <p>Composition Volume measurement & variations Plasma proteins –classification & functions. Red blood cells – development, morphology & measurements –functions & dysfunctions. White blood cells –development –classification, morphology – functions & dysfunctions. Platelets –morphology –development, functions & dysfunctions Clotting –factors –mechanism –anti- coagulants dysfunctions Blood grouping –classification –importance in transfusion, Rh factor & incompatibility Suspension stability Osmotic stability Reticulo endothelial system</p> <ul style="list-style-type: none"> ○ Spleen, lymphatic tissue, Thymus, bone marrow, immune system, cellular, Humoral, Autoimmune | 6 |
| Module 3 | <p>DIGESTION:</p> <p>General arrangement Salivary digestion –functions & regulations Gastric digestion – functions & regulations Pancreatic digestion –functions & regulations Intestinal digestion –functions & regulations Liver & bile Functions of large intestine Neurohumoral regulations of alimentary functions, summary</p> | 4 |



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|-----------|---|---|
| Module 4 | EXCRETION: Body fluids –distribution, measurement & exchange, Kidney – structure of nephron –mechanism of urine formation –composition of the urine and abnormal constituents –urinary bladder & micturition | 2 |
| Module 5 | ENDOCRINES: Hormone mechanism –negative feed backs –tropic action – permissive action – cellular action, hypothalamic regulation Thyroid - hormones, actions, regulations Adrenal cortex - hormones, actions, regulations Adrenal medulla –hormones, actions, regulations Parathyroid - hormones, actions, regulations Islets of pancreas –hormones, actions, regulations Miscellaneous _ hormones, actions, regulations Common clinical disorders | 4 |
| Module 6 | REPRODUCTION: Male reproductive system –control & regulation Female reproductive system –uterus –ovaries –menstrual cycle – regulation – pregnancy & delivery –breast –family planning | 4 |
| Module 7 | RESPIRATION: Mechanics of respiration –pulmonary function tests –transport of respiratory gases- neural and chemical regulation of respiration – hypoxia, cyanosis, dyspnoea– asphyxia. | 4 |
| Module 8 | CIRCULATION: General principles Heart: myocardium –innervation –transmission of cardiac impulse- Events during cardiac cycle –cardiac output. Peripheral circulation: peripheral resistances –arterial blood pressure – measurements –factors regulation variations –capillary circulation – venous circulation. Special circulation: coronary cerebral – miscellaneous | 4 |
| Module 9 | ENVIRONMENTAL PHYSIOLOGY Body temperature regulation (including skin Physiology). Exposure to low and high atmospheric pressure | 4 |
| Module 10 | NERVOUS SYSTEM: Neuron –Conduction of impulse –synapse –receptor. Sensory organization –pathways and perception Reflexes –cerebral cortex –functions. Thalamus –Basal ganglia Cerebellum. Hypothalamus. Autonomic nervous system –motor control of movements, posture | 6 |



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| | and equilibrium – conditioned reflex, eye hand co-ordination | |
| Module 11 | SPECIAL SENSES –(Elementary) Olfaction –Taste –Hearing | 4 |
| | Total Number of Hours | 48 |

Text Books:-

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

Reference Books:-

1. A C Guyton: Text book of Medical Physiology, 8th edition, saunders company, Japan

Course Name: Human Physiology Practical
 Course Code: BOPC104

| | | | | | |
|----------------------------------|----------------------|-----------|------------------|-----------|-------------|
| Course Type: Core (Practical) | Course Details: CC-4 | | L-T-P: 0 - 0 - 4 | | |
| Credit: 4 | Full Marks: 100 | CA Marks | | ESE Marks | |
| | | Practical | Theoretical | Practical | Theoretical |
| | | 60 | ---- | 40 | ---- |

Course Learning Outcomes:

1. Handle microscopes on their own.
2. Perform different blood tests, e.g., blood counts (RBC, WBC, platelets, Hb and differential count), blood grouping, analysis of bleeding time and clotting time.
3. Perform examination on urine and detect presence of abnormal entities.
4. Demonstrate various parts of human Endocrine and Reproductive system.
5. Perform clinical examination of respiratory system like Spirometry, Breath holding test etc.



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6. Practice routine examination of cardiovascular and circulatory system, including blood pressure and pulse rate measurement.
7. Demonstrate various parts of Central Nervous System.

| Module | Topics | No. of Practical D + P |
|----------------------------------|--|-----------------------------------|
| Module 1 | Blood test: Microscope, Haemocytometer, Blood, RBC count, Hb, WBC count, Differential Count, Haematocrit demonstration, ESR, Blood group & Rh. type, Bleeding time and clotting time | 4 + 4 |
| Module 2 | Digestion: Test salivary digestions | 4 + 4 |
| Module 3 | Excretion: Examination of Urine, Specific gravity, Albumin, Sugar, Microscopic examination for cells and cysts | 4 + 4 |
| Module 4 | Endocrinology and Reproduction: Dry experiments in the form of cases showing different endocrine disorders. | 4 + 4 |
| Module 5 | Respiratory System: Clinical examination of respiratory system, Spirometry, Breath holding test | 4 + 4 |
| Module 6 | Cardio Vascular System: Clinical examination of circulatory system, Measurement of blood pressure and pulse rate, Effect of exercise on blood pressure and pulse rate | 2 + 2 |
| Module 7 | Central Nervous System: Sensory system, Motor system, Cranial system, Superficial and deep reflexes | 2 + 2 |
| Total Number of Hours= 48 | | |

Text Books:-

3. L Prakasam reddy, Fundamentals of Medical Physiology, 4th Edition, Paras medical Publisher, Hyderabad, 2008
4. Sujit K. Chaudhuri, Concise Medical Physiology, 6th edition, New Central Book Agency, Kolkata, 2008

Reference Books:-

2. A C Guyton: Text book of Medical Physiology, 8th edition, saunders company, Japan



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Course Name: Physical Optics
Course Code: BOPC105

| | | | | | |
|------------------------------------|----------------------|-----------|------------------|-----------|-------------|
| Course Type: Core (Theoretical) | Course Details: CC-5 | | L-T-P: 4 - 0 - 0 | | |
| Credit: 4 | Full Marks: 100 | CA Marks | | ESE Marks | |
| | | Practical | Theoretical | Practical | Theoretical |
|  |  | .... | 30 | .... | 70 |

Course Learning Outcomes:

The objective of this course is to equip the students with a thorough knowledge of properties of light. At the end of this course, students will be able to predict the distribution of light under various conditions.

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



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|-----|--|-----------|
| 15. | Inverse square law of photometry; Lambert's law. | 3 |
| 16. | Other units of light measurement; retinal illumination; Trolands | 3 |
| | Total Number of Hours= 48 | 48 |

Text Book:

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

Reference Books:

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

Course Name: Physical Optics Practical
Course Code: BOPC106

| | | | | | |
|----------------------------------|----------------------|-----------|------------------|-----------|-------------|
| Course Type: Core (Practical) | Course Details: CC-6 | | L-T-P: 0 - 0 - 4 | | |
| Credit: 4 | Full Marks: 100 | CA Marks | | ESE Marks | |
| | | Practical | Theoretical | Practical | Theoretical |
| | | 60 | ---- | 40 | ---- |

Course Learning Outcomes:

The objective of this course is to equip the students with a thorough knowledge of properties of light. At the end of this course, students will be able to predict the distribution of light under various conditions.

| No. | Topics | No. of Practical D + P* |
|-----|--|----------------------------|
| 1. | Gratings – determination of grating constant using Sodium vapour lamp; determination of wavelengths of light from Mercury vapor lamp | 4 + 4 |
| 2. | Circular Apertures – measurements of Airy's disc for apertures of various sizes | 3 + 3 |



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|----------------------------------|---|-----------|
| 3. | Verification of Malus' Law using a polarizer – analyzer combination | 3 + 3 |
| 4. | Demonstration of birefringence using Calcite crystals | 3 + 3 |
| 5. | Measurement of the resolving power of telescopes. | 3 + 3 |
| 6. | Newton's rings | 3 + 3 |
| 7. | Demonstration of fluorescence and phosphorescence using crystals and paints | 5 + 5 |
| Total Number of Hours= 48 | | 48 |

*** D - Demonstration & P - Practice**

Course Name: Computer Application
 Course Code: AECC101

| | | | | | |
|------------------------------------|------------------------|-----------|------------------|-----------|-------------|
| Course Type: Core (Theoretical) | Course Details: AECC-1 | | L-T-P: 4 - 0 - 0 | | |
| Credit: 4 | Full Marks: 100 | CA Marks | | ESE Marks | |
| | | Practical | Theoretical | Practical | Theoretical |
|  |  | .... | 30 | .... | 70 |

Course Learning Outcomes:

1. Understand the fundamental hardware components that make up a computer's hardware and the role of each of these components
2. Understand the difference between an operating system and an application program, and what each is used for in a computer
3. Describe some examples of computers and state the effect that the use of computer technology has had on some common products
4. Be familiar with software applications
5. Understand file management
6. Accomplish creating basic documents, worksheets, presentations with their properties.
7. Experience working with email and recognize email netiquette.



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Module 1

Introduction and Definition of Computer: Computer Generation, Characteristics of Computer, Advantages and Limitations of a computer, Classification of computers, Functional components of a computer system (Input, CPU, Storage and Output Unit), Types of memory (Primary and Secondary) Memory Hierarchy. Hardware: a) Input Devices- Keyboard, Mouse, Scanner, Bar Code Reader b) Output Devices – Visual Display Unit (VDU), Printers, Plotters etc. Software: Introduction, types of software with examples, Introduction to languages, Compiler, Interpreter and Assembler. Number System: Decimal, Octal, Binary and Hexadecimal Conversions, BCD, ASCII and EBCDIC Codes. (Lecture 12)

Module 2

MS – DOS: Getting Started on DOS with Booting the System, Internal Commands: CHDIR(CD),CLS, COPY, DATE, DEL(ERASE), DIR, CHARACTER, EXIT,MKDIR(MD), REM, RENAME(REN), RMDIR(RD), TIME, TYPE, VER, VOL, External Commands: ATTRIB, CHKDSK, COMMAND, DOSKEY, EDIT, FORMAT,HELP, LABEL, MORE, REPLACE, RESTORE, SORT, TREE, UNDELETE, UNFORMAT,XCOPY.

Introduction of Internet: History of internet, Web Browsers, Searching and Surfing, Creating an E-Mail account, sending and receiving E-Mails. (Lecture 08)

Module 3

MS Word: Starting MS WORD, Creating and formatting a document, Changing fonts and point size, Table Creation and operations, Autocorrect, Auto text, spell Check, Word Art, Inserting objects, Page setup, Page Preview, Printing a document, Mail Merge. (Lecture 08)

Module 4

MS Excel: Starting Excel, Work sheet, cell inserting Data into Rows/ Columns, Alignment, Text wrapping , Sorting data, Auto Sum, Use of functions, Cell Referencing form, Generating graphs, Worksheet data and charts with WORD, Creating Hyperlink to a WORD document, Page set up, Print Preview, Printing Worksheets.

MS Power Point: Starting MS–Power Point,, Creating a presentation using auto content Wizard,

Blank Presentation, creating, saving and printing a presentation, Adding a slide to presentation, Navigating through a presentation, slide sorter, slide show, editing slides, Using Clipart, Word art gallery, Adding Transition and Animation effects, setting timings for slide show, preparing note pages, preparing audience handouts, printing presentation documents. MS – Access: creating table and database.

(Lecture 08)



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Module 5

MS-POWERPOINT: Starting MS–Power Point,, Creating a presentation using auto content Wizard, Blank Presentation, creating, saving and printing a presentation, Adding a slide to presentation, Navigating through a presentation, slide sorter, slide show, editing slides, Using Clipart, Word art gallery, Adding Transition and Animation effects, setting timings for slide show, preparing note pages, preparing audience handouts, printing presentation documents.

(Lecture 12)

Text Books:

1. Sinha P.K., Computer Fundamentals, BPB Publishing.
2. Bill Bruck., The Essentials Office 2000 Book, BPB Publishing.
3. Leon A. & Leon M., Introductions to Computers, Vikas Publications.

Reference Books:

1. Peter Norton_s, Introductions to Computers, Tata McGraw Hill.
2. Price Michael, Office in Easy Steps, TMH Publication.

Course Name: Computer Application Practical
Course Code: AECC102

| Course Type: Core (Practical) | Course Details: AECC-2 | | L-T-P: 0 - 0 - 4 | | |
|----------------------------------|------------------------|-----------|------------------|-----------|-------------|
| Credit: 4 | Full Marks: 100 | CA Marks | | ESE Marks | |
| | | Practical | Theoretical | Practical | Theoretical |
| | | 60 | ---- | 40 | ---- |

Computer fundamental and internet lab Practical

3x16 = 48

1. Using basic DOS commands.
2. Using external DOS commands
3. Creating a email account
4. Using web browser for searching and surfing.
5. Creating and formatting a document in MS office
6. Using autocorrect, auto text and spell check operation in MS office.
7. Create tables in MS Word.



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8. Inserting different kinds of object in MS word.
9. Use main merge options in MS office.
10. Create an Excel work sheet with following options rows and columns alignment.
11. Using excel formulas.
12. Create a graph with available data in MS excel.
13. Create a PPT presentation using auto content wizard.
14. Use Clip art animation effects and word art galleries in presentations.
15. Using transition and setting timings for slide show.
16. Use MS access to create data base and tables.

Course Name: English Communication
Course Code: AECC103

| | | | | | |
|------------------------------------|------------------------|-----------|------------------|-----------|-------------|
| Course Type: Core (Theoretical) | Course Details: AECC-3 | | L-T-P: 3 - 0 - 0 | | |
| Credit: 3 | Full Marks: 100 | CA Marks | | ESE Marks | |
| | | Practical | Theoretical | Practical | Theoretical |
|  |  | .... | 30 | .... | 70 |

Course Learning Outcomes:

1. Students will realize the significance of English for their career progression
2. Benchmarking the students in the first semester to observe their progression in terms of LSRW
3. Students will be able to understand distinct sounds and improve pronunciation
4. Students will improve their English vocabulary of daily usage
5. Students will be able to form simple sentences to talk about themselves, friends and relatives.
6. Students will be able to imbibe the pre-requisites of personality development.



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Module -1: Introduction to English language (7 Lectures)

- a) Role and significance of English language in the present scenario
- b) English Language: Its relevance for the Indian industry
- c) Introduction to Listening, Speaking, Reading, Writing (LSRW) and benchmarking of the class

[Note: As part of classroom activity, a guest lecture from an industry representative/Director (CRC) and maintaining progress card for each student on LSRW for future reference]

Module -2: Phonetics & Functional Grammar (7 Lectures)

- a) Pronunciation and daily usage correction (speak with differences between p/b, s/sh, f/ph, t/d, v/w sounds)
- b) Parts of speech, articles, tenses, verbs and modals
- c) Practice of daily use words, numerals and tongue twisters
- d) Vocabulary building, Construction of simple sentences: Basic sentence pattern, subject and Predicate

[Note: As part of classroom activity, language games, tongue & jaw exercises, simple passages from the newspapers for oral drills in the classroom and practice tests (written and oral)]

Module -3: English Communication- About Myself (7 Lectures)

- a) Let's talk, making conversation, meeting and greeting
- b) Introducing myself, my family and my friends
- c) My opinions, my likes and dislikes
- d) Life at college, hostel and workplace

[Note: As part of classroom activity, use the Work book for reference for classroom and home assignments, carry out practice tests (written and oral)]

Module -4: Basic Communication & Soft Skills (7 Lectures)

- a) Reading comprehension
- b) Building conversational skills
- c) Verbal & Non-verbal communication

[Note: As part of classroom activity, review and recap the last semester and carry out (oral and written) practice test to update the progress card of each student, refer to the Workbook]

Module -5: Vocabulary: Building Blocks (7 Lectures)

- a) Word Formation: Prefix, suffix, conversion and compounding
- b) Homophones and one-word substitution
- c) Words often confused and misused



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d) Idiomatic phrase, Antonyms and Synonyms

[Note: As part of classroom activity, organize and learning language games, initiate the learning of 5 new words per class]

Module-6: English Communication: World around Me (6 Lectures)

a) Market place, Bus stop, Bank, Post Office

b) Village, Town and City

c) Eating out: Stall, Dhaba and Restaurant

[Note: As part of classroom activity, refer Work book for classroom and home assignments, carry out practice tests (written and oral)]

Module -7: Personality Development (7 Lectures)

a) First impression: Dressing sense, good manners, speaking well and respectably

b) Positive Attitude: Being happy and alert, a good listener and a good friend

c) Consultation among peers: Soliciting advice and giving advice

d) Goal setting, confidence building & handling rejection

[Note: As part of classroom activity, refer Work book for classroom and home assignments, carry out practice tests (written and oral)]

Total lectures = 48

Reference Books:

ILFS Bi-lingual Course in Basic English, ILFS Skill Development Corporation
English Grammar Composition & Usage by J.C. Nesfield, Macmillan Publishers The
Business letters by Madan Sood, Goodwill Publishing House, New Delhi
Communication Skills by Sanjay Kumar & Pushp Lata, Oxford University Press



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Semester II

| Course Code | Course Name | L - T - P | Credits | Total Marks |
|--------------------|---------------------------------|------------------|----------------|--------------------|
| BOPC201 | Ocular Anatomy | 4-0-0 | 4 | 100 |
| BOPC202 | Ocular Physiology | 4-0-0 | 4 | 100 |
| BOPC203 | General and Ocular Biochemistry | 4-0-0 | 4 | 100 |
| BOPC204 | Geometrical Optics | 4-0-0 | 4 | 100 |
| BOPC205 | Geometrical Optics Practical | 0-0-4 | 2 | 100 |
| GEC-1 | Generic Elective | 4-0-0 | 4 | 100 |
| AEE201 | Environmental Studies | 4-0-0 | 4 | 100 |
| TOTAL | | | 26 | 700 |



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Course Name: Ocular Anatomy
 Course Code: BOPC201

| | | | | | |
|------------------------------------|----------------------|-----------|------------------|-----------|-------------|
| Course Type: Core (Theoretical) | Course Details: CC-7 | | L-T-P: 4 - 0 - 0 | | |
| Credit: 4 | Full Marks: 100 | CA Marks | | ESE Marks | |
| | | Practical | Theoretical | Practical | Theoretical |
|  |  | .... | 30 | .... | 70 |

Course Learning Outcomes:

At the end of the course, the student should be able to:

1. Comprehend the normal disposition, inter-relationships, gross, functional and applied anatomy of various structures in the eye and adnexa.
2. Identify the microscopic structures of various tissues in the eye and correlate the structure with the functions.
3. Comprehend the basic structure and connections between the various parts of the central nervous system and the eye so as to understand the neural connections and distribution.
4. To understand the basic principles of ocular embryology.

| No. | Topics | No. of Lectures |
|-----|--|-----------------|
| 1. | Anatomy of Orbital cavity -Bones forming the orbital margins and orbit | 4 |
| 2. | Blood Supply of Orbit | 2 |
| 3. | Development of the eye ball | 4 |
| 4. | Ocular Adnexa - Eye Lids, Conjunctiva and Cornea | 4 |
| 5. | Anatomy of Lacrimal apparatus | 2 |
| 6. | Anatomy of Eye ball (Sclera, uveal tract) | 4 |
| 7. | Anatomy of angle of anterior chamber, posterior chamber and Vitreous | 4 |
| 8. | Anatomy of Crystalline lens | 4 |
| 9. | Anatomy of the Retina | 4 |
| 10. | Movement of eyeball and extra ocular muscles | 4 |



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| | | |
|-----|--|-----------|
| 11. | Nerve supply of the eyeball -Optic nerve -Oculomotor nerve | 4 |
| 12. | Functional areas for vision – lower and upper visual centers | 4 |
| 13. | Visual Pathway | 4 |
| | Total number of Lectures | 48 |

Text Book:

L A Remington: Clinical Anatomy of the Visual System, Second edition, Elsevier Butterworth Heinemann, Missouri, USA, 2005.

Reference Books:

AK Khurana, Indu Khurana: Anatomy and Physiology of Eye, Second edition, CBS Publishers, New Delhi, 2006

Course Name: Ocular Physiology
Course Code: BOPC202

| | | | | | |
|------------------------------------|----------------------|-----------|------------------|-----------|-------------|
| Course Type: Core (Theoretical) | Course Details: CC-8 | | L-T-P: 4 - 0 - 0 | | |
| Credit: 4 | Full Marks: 100 | CA Marks | | ESE Marks | |
| | | Practical | Theoretical | Practical | Theoretical |
|  |  | .... | 30 | .... | 70 |

Course Learning Outcomes:

At the end of the course, the student should be able to:

1. Explain the normal functioning of all structures of the eye and their interactions
2. Elucidate the physiological aspects of normal growth and development of the eye
3. Understand the phenomenon of vision
4. List the physiological principles underlying pathogenesis and treatment of diseases of the eye.



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| No. | Topics | No. of Lectures |
|-----|--|-----------------|
| 1. | Protective mechanisms in the eye: Eye lids and lacrimation, description of the globe | 2 |
| 2. | Extrinsic eye muscles, their actions and control of their movements | 4 |
| 3. | Coats of the eyeball | 2 |
| 4. | Cornea | 6 |
| 5. | Aqueous humor and vitreous: Intra ocular pressure | 4 |
| 6. | Iris and pupil | 2 |
| 7. | Crystalline lens and accommodation –presbyopia | 4 |
| 8. | Retina – structure and functions | 2 |
| 9. | Pigments of the eye and photochemistry | 2 |
| 10. | The visual stimulus, refractive errors | 4 |
| 11. | Visual acuity and principle of measurement | 4 |
| 12. | Visual perception – Binocular vision, stereoscopic vision, optical illusions | 2 |
| 13. | Visual pathway, central and cerebral connections | 4 |
| 14. | Colour vision and colour defects. Theories and diagnostic tests | 2 |
| 15. | Scotopic and Photopic vision | 2 |
| 16. | Visual perception and adaptation | 2 |
| | Total number of Lectures | 48 |



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Text Book:

1. AK Khurana, Indu Khurana: Anatomy and Physiology of Eye, Second edition, CBS Publishers, New Delhi, 2006

Reference Books:

1. RD Ravindran: Physiology of the eye, Arvind eye hospitals, Pondicherry, 2001
2. PL Kaufman, A Alm: Adler's Physiology of the eye clinical application, 10th edition, Mosby, 2002

Course Name: General and Ocular Biochemistry
Course Code: BOPC203

| Course Type: Core (Theoretical) | Course Details: CC-9 | | L-T-P: 4 - 0 - 0 | | |
|------------------------------------|----------------------|-----------|------------------|-----------|-------------|
| Credit: 4 | Full Marks: 100 | CA Marks | | ESE Marks | |
| | | Practical | Theoretical | Practical | Theoretical |
| | | ---- | 30 | ---- | 70 |

Course Learning Outcomes:

At the end of the course, the student should be able to demonstrate his knowledge and understanding on

1. Structure, function and interrelationship of biomolecules and consequences of deviation from the normal
2. Integration of various aspects of metabolism and their regulatory pathways
3. Principles of various conventional and specialized laboratory investigations and instrumentation, analysis and interpretation of a given data
4. Understand metabolic processes taking place in different ocular structures.



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| No. | Topics | No. of Lectures |
|-----|--|-----------------|
| 1. | Carbohydrates: Glucose; fructose; galactose; lactose; sucrose; starch and glycogen (properties and tests, Structure and function) | 3 |
| 2. | Proteins: Amino acids, peptides, and proteins (general properties & tests with a few examples like glycine, tryptophan, glutathione, albumin, hemoglobin, collagen) | 3 |
| 3. | Lipids: Fatty acids, saturated and unsaturated, cholesterol and triacylglycerol, phospholipids and plasma membrane | 3 |
| 4. | Vitamins: General with emphasis on A,B2, C, E and inositol (requirements, assimilation and properties) | 3 |
| 5. | Minerals: Na, K, Ca, P, Fe, Cu and Se.(requirements, availability and properties) | 3 |
| 6. | Carbohydrates: Glucose; fructose; galactose; lactose; sucrose; starch and glycogen (properties and tests, Structure and function) | 3 |
| 7 | Hormones basic concepts in metabolic regulation with examples say insulin. | 3 |
| 8 | Metabolism: General whole body metabolism(carbohydrates, proteins, lipids) | 3 |
| 9 | Ocular Biochemistry: Various aspects of the eye, viz., cornea, lens aqueous, vitreous, retina and pigment rhodopsin. (The important chemicals in each and their roles.) | 3 |
| 10 | Immunology of anterior segment | 3 |



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| | | |
|----|---|-----------|
| 11 | 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. | 9 |
| 12 | Clinical Biochemistry: Blood sugar, urea, creatinine and bilirubin significance of their estimation. | 9 |
| | Total | 48 |

Text Book:

1. 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 Whikehart: Biochemistry of the Eye, 2nd edition, Butterworth Heinemann, Pennsylvania, 2003

Course Name: Geometrical Optics
Course Code: BOPC204

| | | | | | |
|------------------------------------|-----------------------|-----------|------------------|-----------|-------------|
| Course Type: Core (Theoretical) | Course Details: CC-10 | | L-T-P: 4 - 0 - 0 | | |
| Credit: 4 | Full Marks: 100 | CA Marks | | ESE Marks | |
| | | Practical | Theoretical | Practical | Theoretical |
|  |  | .... | 30 | .... | 70 |

Course Learning Outcomes:

The objective of this course is to equip the students with a thorough knowledge of mirrors and lenses. At the end of this course, students will be able to predict the basic properties of the images formed on the retina by the optics of the eye.



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| No. | Topics | No. of Lectures |
|-----|---|-----------------|
| 1. | Wavefronts–spherical, elliptical and plane; Curvature and vergence; rays; convergence and divergence in terms of rays and vergence; vergence at a distance | 2 |
| 2. | Refractive index; its dependence on wavelength | 3 |
| 3. | Fermat’s and Huygen’s Principle –Derivation of laws of reflection and refraction (Snell’s law) from these principles | 2 |
| 4. | Plane mirrors –height of the mirror; rotation of the mirror | 2 |
| 5. | Reflection by a spherical mirror –paraxial approximation; sign convention; derivation of vergence equation | 2 |
| 6. | Imaging by concave mirror, convex mirror | 2 |
| 7. | Reflectivity; transmissivity; Snell’s Law, Refraction at a plane surface | 2 |
| 8. | Glass slab; displacement without deviation; displacement without dispersion | 2 |
| 9. | Thick prisms; angle of prism; deviation produced by a prism; refractive index of the prism | 2 |
| 10. | Prisms; angular dispersion; dispersive power; Abbe’s number. | 2 |
| 11. | Definition of crown and flint glasses; materials of high refractive index | 2 |
| 12. | Thin prism –definition; definition of Prism diopter; deviation produced by a thin prism; its dependence on refractive index | 2 |
| 13. | Refraction by a spherical surface; sign convention; introduction to spherical aberration using image formed by a spherical surface of a distance object; sag formula | 2 |
| 14. | Paraxial approximation; derivation of vergence equation | 1 |
| 15. | Imaging by a positive powered surface and negative powered surface | 2 |
| 16. | Vergence at a distance formula; effectivity of a refracting surface | 2 |
| 17. | Definition of a lens as a combination of two surfaces; different types of lens shapes. | 2 |
| 18. | 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 | 2 |
| 19. | Newton’s formula; linear magnification; angular magnification | 2 |
| 20. | Nodal Planes | 2 |
| 21. | Thin lens as a special case of thick lens; review of sign | 2 |



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| | convention | |
| 22. | Imaging by a thin convex lens; image properties (real/virtual; erect/inverted; magnified/minified) for various object positions | 2 |
| 23. | Imaging by a thin concave lens; image properties (real/virtual; erect/inverted; magnified/minified) for various object positions | 1 |
| 24. | Prentice's Rule | 1 |
| 25. | System of two thin lenses; review of front and back vertex powers and equivalent power, review of six cardinal points. | 1 |
| 26. | System of more than two thin lenses; calculation of equivalent power using magnification formula | 1 |
| | Total number of Lectures | 48 |

Text Book:

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

Reference Books:

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

Course Name: Geometrical Optics Practical
 Course Code: BOPC205

| | | | | | |
|----------------------------------|-----------------------|-----------|------------------|-----------|-------------|
| Course Type: Core (Practical) | Course Details: CC-11 | | L-T-P: 0 - 0 - 4 | | |
| Credit: 4 | Full Marks: 100 | CA Marks | | ESE Marks | |
| | | Practical | Theoretical | Practical | Theoretical |
| | | 60 | ---- | 40 | ---- |



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Course Learning Outcomes:

The objective of this course is to equip the students with a thorough knowledge of properties of light. At the end of this course, students will be able to predict the distribution of light under various conditions.

| No. | Topics | No. of Practical D+P* |
|-----|---|-----------------------|
| 1. | Thick Prism – determination of prism angle and dispersive power; calculation of the refractive index | 4+4 |
| 2. | Thin Prism – measurement of deviation; calculation of the prism diopter | 5+5 |
| 3. | Image formation by spherical mirrors | 5+5 |
| 4. | Convex lens - power determination using lens gauge, power determination using distant object method; power determination using the vergence formula | 5+5 |
| 5. | Concave lens – in combination with a convex lens – power determination. | 5+5 |
| | Total | 48 |

* D - Demonstration & P - Practice



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PROGRAM OUTLINE

Semester III

| Course Code | Course Name | L - T - P | Credits | Total Marks |
|--------------------|---|------------------|----------------|--------------------|
| BOPC301 | Ocular Microbiology and Pathology | 3-0-2 | 4 | 100 |
| BOPC302 | Visual Optics – I | 3-1-0 | 4 | 100 |
| BOPC303 | Ophthalmic Lens and Dispensing Optics – I | 3-0-2 | 4 | 100 |
| BOPC304 | Optometric Instrumentation | 3-0-2 | 4 | 100 |
| BOPC305 | Ocular Disease – I | 4-0-0 | 4 | 100 |
| BOPC306 | Clinical Optometry – I | 0-0-4 | 2 | 100 |
| GEC-2 | Generic Elective | 4-0-0 | 4 | 100 |
| TOTAL | | | 26 | 700 |



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Course Name: Ocular Microbiology and Pathology
Course Code: BOPC301

| | | | | | |
|------------------------------------|-----------------------|-----------|------------------|-----------|-------------|
| Course Type: Core (Theoretical) | Course Details: CC-12 | | L-T-P: 3 - 0 - 2 | | |
| Credit: 4 | Full Marks: 100 | CA Marks | | ESE Marks | |
| | | Practical | Theoretical | Practical | Theoretical |
|  |  | .... | 30 | .... | 70 |

Course Learning Outcomes:

At the end of the course, the student should be able to:

1. To prepare the students to gain essential knowledge about the characteristics of bacteria, viruses, fungi and parasites;
2. To acquire knowledge of the principles of sterilization and disinfection in hospital and ophthalmic practice;
3. To understand the pathogenesis of the diseases caused by the organisms in the human body with particular reference to the eye infections
4. To understand basic principles of diagnostic ocular Microbiology.
5. Inflammation and repair aspects.
6. Pathology of various eye parts and adnexa.

| No. | Topics | No. of Lectures |
|-----|---|-----------------|
| 14. | Morphology and principles of cultivating bacteria | 3 |
| 15. | Sterilization and dis-infections used in laboratory and hospital practice | 3 |
| 16. | Common bacterial infections of the eye. | 3 |
| 17. | Common fungal infections of the eye | 3 |
| 18. | Common viral infections of the eye. | 3 |
| 19. | Common parasitic infections of the eye. | 3 |
| 20. | Inflammation and repair | 3 |
| 21. | Infection in general | 3 |
| 22. | Specific infections - Tuberculosis, Leprosy, Syphilis, Fungal infection, Viral chlamydial infection | 3 |



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| | | |
|-----|---|-----------|
| 23. | Neoplasia | 3 |
| 24. | Hematology - Anemia, Leukemia and Bleeding disorders | 3 |
| 25. | Circulatory disturbances - Thrombosis, Infarction, Embolism | 3 |
| 26. | Clinical pathology - Interpretation of urine report, Interpretation of blood smears | 3 |
| 27. | Immune system | 3 |
| 28. | Shock, Anaphylaxis. | 3 |
| 29. | Allergy | 3 |
| | Total number of Lectures | 48 |

TEXT BOOK:

1. BURTON G.R.W: Microbiology for the Health Sciences, third edition, J.P. Lippincott Co., St. Louis,1988.
2. M J Pelczar (Jr),ECS Chan, NR Krieg : Microbiology ,fifth edition, TATA McGRAW-HILL Publisher, NewDelhi,1993

REFERENCE BOOKS:

1. KJ Ryan, CG Ray: Sherris Medical Microbiology- An Introduction to infectious Diseases, fourth edition, McGRAW HILL Publisher, New Delhi, 1994 MACKIE & McCartney Practical Medical Microbiology
 2. SYDNEY M. FINEGOLD & ELLEN JO BARON: Diagnostic Microbiology (DM)5
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Course Name: Visual Optics -I
 Course Code: BOPC302

| | | | | | |
|------------------------------------|-----------------------|-----------|------------------|-----------|-------------|
| Course Type: Core (Theoretical) | Course Details: CC-13 | | L-T-P: 3 - 1 - 0 | | |
| Credit: 4 | Full Marks: 100 | CA Marks | | ESE Marks | |
| | | Practical | Theoretical | Practical | Theoretical |
|  |  | .... | 30 | .... | 70 |

Course Learning Outcomes:

At the end of the course, the student should be able to:

1. To understand the fundamentals of optical components of the eye
2. To gain theoretical knowledge and practical skill on visual acuity measurement, objective and subjective clinical refraction.

| No. | Topics | No. of Lectures |
|-----|---|-----------------|
| 17. | Review of Geometrical Optics: From Geometrical Optics. | 4 |
| 18. | Schematic and reduced eyes and their properties. | 6 |
| 19. | Optical constants of the eye and their measurement. Purkinje images. Corneal curvature and thickness. Keratometry and pachometry. Indices of aqueous and vitreous. | 6 |
| 20. | Optical Defects of the Eye- Shape of Cornea, Shape & RI of the lens, Optical axis, Visual axis (angle alpha, Fixation axis (angle gamma), Aberration of the Optical system of eye, Depth of focus, Diffraction & resolving power. | 10 |
| 21. | Emmetropia and ametropia, Axial versus spherical ametropia, Myopia Hypermetropia(Hyperopia) Astigmatism. | 6 |
| 22. | Accommodation- possible mechanism of accommodation- Schiener disc experiment- theories of accommodation- modern theory- changes in the lens during accommodation- the amplitude of accommodation- the measurement of the amplitude n of accommodation- depth of field, luminance and blur tolerance- amplitude of accommodation versus age. | 10 |
| 23. | Presbiopia-near vision addition- estimate of addition-unequal near vision addition- effect of changing the spectacle distance – hypermetropia and accommodation. | 6 |
| | Total number of Lectures | 48 |



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TEXT BOOK:

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

REFERENCE BOOKS:

1. M P Keating: Geometric, Physical and Visual optics, 2nd edition, Butterworth-Heinemann, USA, 2002
2. HL Rubin: Optics for clinicians, 2nd edition, Triad publishing company. Florida, 1974.
3. H Obstfeld: Optic in Vision- Foundations of visual optics & associated computations, 2nd edition, Butterworth, UK, 1982.
4. WJ Benjamin: Borish's clinical refraction, 2nd edition, Butterworth Heinemann, Missouri, USA, 2006

Course Name: Ophthalmic Lens and Dispensing Optics – I
Course Code: BOPC303

| | | | | | |
|------------------------------------|-----------------------|-----------|------------------|-----------|-------------|
| Course Type: Core (Theoretical) | Course Details: CC-14 | | L-T-P: 3 - 0 - 2 | | |
| Credit: 4 | Full Marks: 100 | CA Marks | | ESE Marks | |
| | | Practical | Theoretical | Practical | Theoretical |
| | | ---- | 30 | ---- | 70 |

Course Learning Outcomes:

At the end of the course, the student should be able to demonstrate his knowledge and understanding on

1. Measurement of lens power, lens centration using conventional techniques
2. Transposition of various types of lenses •Knowledge to identify different forms of lenses (equi- convex, planoconvex, periscopic.)
3. Knowledge to select the tool power for grinding process.
4. Measurement of surface powers using lens measure.



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5. Method of laying off the lens for glazing process.
6. Ophthalmic prism knowledge –effects, units, base-apex notation, compounding and resolving prisms.
7. Knowledge of prism and decentration in ophthalmic lenses
8. Knowledge of different types of materials used to make lenses and its characteristics
9. Knowledge lens designs –single vision, bifocals, progressive lens
10. Knowledge on tinted and protective lenses
11. Knowledge on special lenses like iseikonic, spectacle magnifiers.
12. Knowledge on spectacle frames –manufacture, materials

| No. | Topics | No. of Lectures |
|-----|--|-----------------|
| 1. | Introduction –Light, Mirror, Reflection, Refraction and Absorption | 4 |
| 2. | Prisms –Definition, properties, Refraction through prisms, Thickness difference, Base-apex notation, uses, nomenclature and units, Sign Conventions, Fresnel’s prisms, rotary prisms | 6 |
| 3. | Lenses –Definition, units, terminology used to describe form of lenses | 4 |
| 4. | Vertex distance and vertex power, Effectivity calculations | 4 |
| 5. | Lens shape, size and types i.e. Spherical, cylindrical and Sphero-cylindrical | 4 |
| 6. | Transpositions –Simple, Toric and Spherical equivalent | 4 |
| 7 | Prismatic effect, centration, decentration and Prentice rule, Prismatic effect of Plano- cylinder and Sphere cylinder lenses | 6 |
| 8 | Spherometer & Sag formula, Edge thickness calculations | 4 |
| 9 | Magnification in high plus lenses, Minification in high minus lenses | 4 |
| 10 | Tilt induced power in spectacles | 4 |
| 11 | Aberration in Ophthalmic Lenses | 4 |
| | Total | 48 |



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TEXT BOOK: Jalie M: The principles of Ophthalmic Lenses, The Association of Dispensing Opticians, London, 1994.

REFERENCE BOOKS:

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

Course Name: Optometric Instrumentation
Course Code: BOPC304

| | | | | | |
|------------------------------------|-----------------------|-----------|-------------|------------------|-------------|
| Course Type: Core (Theoretical) | Course Details: CC-15 | | | L-T-P: 3 - 0 - 2 | |
| Credit: 4 | Full Marks: 100 | CA Marks | | ESE Marks | |
| | | Practical | Theoretical | Practical | Theoretical |
|  |  | .... | 30 | .... | 70 |

Course Learning Outcomes:

Detailed study of the principles of operation, types, optical properties, constructions, adjustments and applications of the following Instruments and Devices:

1. Simple and Compound Microscopes (with Huygens and Ramsden Eye pieces and oil immersion objectives), Spectrometer.
2. Radiuscope
3. Retinoscopes
4. Standard Tests Charts.
5. Autorefractometer- subjective and objective types
6. Ophthalmoscopes- direct and indirect types.
7. Refractometers- Auto refractors, Dioptron
8. Slit lamp Biomicroscope
9. Keratometer
10. Lensometer
11. Trial case lenses-best forms.
12. Trial frame design.
13. Cross cylinder.



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| No. | Topics | No. of Lectures |
|-----|---|-----------------|
| 1. | Simple and Compound Microscopes (with Huygens and Ramsden Eye pieces and oil immersion objectives), Spectrometer. | 2 |
| 2. | Radiuscope | 2 |
| 3. | Retinoscopes | 4 |
| 4. | Standard Tests Charts. | 4 |
| 5. | Autorefractometer- subjective and objective types | 4 |
| 6. | Ophthalmoscopes- direct and indirect types. | 4 |
| 7. | Refractometers- Auto refractors, Dioptron | 4 |
| 8. | Slit lamp Biomicroscope | 4 |
| 9. | Keratometer | 4 |
| 10. | Lensometer | 4 |
| 11. | Trial case lenses-best forms. | 4 |
| 12. | Trial frame design. | 4 |
| 13. | Cross cylinder. | 4 |
| | Total number of Lectures | 48 |

TEXT BOOK:

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

REFERENCE BOOKS:

1.P R Yoder: Mounting Optics in Optical Instruments, SPIE Society of Photo- Optical Instrumentation, 2002

2.G Smith, D A. Atchison: The Eye and Visual Optical Instruments, Cambridge University Press, 1997



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Course Name: Ocular Disease – I
Course Code: BOPC305

| | | | | | |
|------------------------------------|-----------------------|-----------|------------------|-----------|-------------|
| Course Type: Core (Theoretical) | Course Details: CC-16 | | L-T-P: 4 - 0 - 0 | | |
| Credit: 4 | Full Marks: 100 | CA Marks | | ESE Marks | |
| | | Practical | Theoretical | Practical | Theoretical |
|  |  | .... | 30 | .... | 70 |

Course Learning Outcomes:

At the end of the course the students will be knowledgeable in the following aspects of ocular diseases:

1. Etiology
2. Epidemiology
3. Symptoms
4. Signs
5. Course sequelae of ocular disease
6. Diagnostic approach and
7. Management of the ocular diseases.

| No. | Topics | No. of Lectures |
|-----|---|-----------------|
| 1. | Disease of the Lids – Congenital Deformities of the Lids Oedema of the Lids. Inflammatory Conditions of the Lids. Deformities of the Lid Margins. Deranged Movement of the Eyelids. Neoplasm's of the Lids. Injuries of the Lids. | 8 |
| 2. | Diseases of the Lachrymal Apparatus- Dry Eye. Disease of the Lachrymal Gland. Disease of the Lachrymal Passages. Operations for Chronic Dacryocystitis. | 8 |
| 3. | Disease of the Conjunctiva- Subconjunctival Hemorrhage Infective Conjunctivitis. Follicular Conjunctivitis. Granulomatous Conjunctivitis. Allergic Conjunctivitis. Conjunctivitis Associated with Skin conditions. Degenerative conditions of the Conjunctiva. Vitamin- A Deficiency. Cysts and | 6 |



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| | | |
|----|--|-----------|
| | Tumors of the Conjunctiva. Conjunctival Pigmentation. Injuries of the Conjunctiva. | |
| 4. | Disease of the Cornea – Congenital Anomalies. Inflammation of the Cornea (Keratitis). Superficial Keratitis. Deep Keratitis. Vascularization of Cornea. Opacities of the Cornea. Keratoplasty. Corneal Degenerations. Corneal Dystrophy's. Corneal Pigmentation. Corneal Injuries. Refractive Corneal Surgery. Corneal Ulcer (Bacterial , Viral , Fungal) | 8 |
| 5. | Disease of the Sclera- Episcleritis. Scleritis. Staphyloma of the Sclera. Blue Sclerotic Scleromalacia Performs. Nanophthalmos. Injuries of the Sclera. | 10 |
| 6. | Disease of the Iris.- Congenital Anomalies. Inflammations (Anterior Uveitis) . Specific Types of Iridocyclitis. Degenerations of the Iris. Cysts and Tumors of the Iris. Injuries of the Iris. | 8 |
| 7 | Disease of the Celery Body- Inflammations of the Celery Body. Purulent Iridocyclitis (Panophthalmitis) .Evisceration . Sympathetic Ophthalmia. Vogt-Koyanagi – Harada Syndrome. Tumors of the Celery body. Injuries of the Celery body. | |
| 8 | Disease of the Lens- Congenital Malformations. Cataract . Congenital and Developmental Cataract Senile Cataract. Traumatic Cataract. Complicated Cataract. Secondary Cataract . After Cataract. Dislocation of the Lens. Surgical Procedures for Removal of the Lens(Operative Steps Only). Phacoemulsification(ICCE,ECCE,IOL) . Small Incision Cataract Surgery (Manual Phaco).Intraocular Lens Implantation-AC+PC, IOL. | |
| | Total number of Lectures | 48 |

TEXT BOOK:

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

REFERENCE BOOKS:

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



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Course Name: Clinical Optometry – I
Course Code: BOPC306

| | | | | | |
|----------------------------------|-----------------------|-----------|------------------|-----------|-------------|
| Course Type: Core (Practical) | Course Details: CC-17 | | L-T-P: 0 - 0 - 4 | | |
| Credit: 2 | Full Marks: 100 | CA Marks | | ESE Marks | |
| | | Practical | Theoretical | Practical | Theoretical |
| | | 60 | ---- | 40 | ---- |

Course Learning Outcomes:

Students will observe the basic operations of the optometry clinic while interacting with the multidisciplinary team members involved in providing optimal care to patients. The student will be introduced to optical terminology, equipment, and techniques used for treatment.

| No. | Topics | No. of Practical D+P* |
|-----|--|-----------------------|
| 1. | History taking | 9 |
| 2. | Visual acuity estimation | 9 |
| 3. | Extraocular motility, Cover test, Alternating cover test | 12 |
| 4. | Hirschberg test, Modified Krimsky | 9 |
| 5. | Pupils Examination | 9 |
| | Total | 48 |

* D - Demonstration & P - Practice



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Semester – IV

| | | | | | |
|---|----|----------|-------|----------|---|
| Ophthalmic Lens and Dispensing Optics – II | C | BOPC401 | CC-18 | 4-0-0 | 4 |
| Ophthalmic Lens and Dispensing Optics – II Practical | C | BOPC402 | CC-19 | 0-0-4 | 2 |
| Visual Optics – II | C | BOPC403 | CC-20 | 3-0-2 | 4 |
| Ocular Disease – II | C | BOPC404 | CC-21 | 4-0-0 | 4 |
| Geriatric Optometry and Pediatric Optometry | C | BOPC405 | CC-22 | 3-0-2 | 4 |
| Basic and Ocular Pharmacology | C | BOPC406 | CC-23 | 3-0-0 | 3 |
| Clinical Optometry – II | C | BOPC407 | CC-24 | 0-0-4 | 2 |
| Choose from the pool of generic elective courses offered in the second semester of allied health science disciplines other than the discipline in which degree program is taken | GE | See pool | GEC-3 | See pool | 4 |

Course Name: Ophthalmic Lens and Dispensing Optics – II
 Course Code: BOPC401

| | | | | | |
|------------------------------------|-----------------------|-----------|------------------|-----------|-------------|
| Course Type: Core (Theoretical) | Course Details: CC-18 | | L-T-P: 4 - 0 - 0 | | |
| Credit: 4 | Full Marks: 100 | CA Marks | | ESE Marks | |
| | | Practical | Theoretical | Practical | Theoretical |
|  |  | .... | 30 | .... | 70 |

Course Objectives: Skills/knowledge to be acquired at the end of this course:

1. To select the tool power for grinding process
2. Different types of materials used to make lenses and its characteristics
3. Lens designs–Bifocals, progressive lens
4. Tinted, Protective & Special lenses
5. Spectacle frames –manufacture process &materials



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6. Art and science of dispensing spectacle lens and frames based on the glass prescription.
7. Reading of spectacle prescription. Counseling the patient
8. Lens edge thickness calculation
9. Frame & lens measurements and selection
10. Writing spectacle lens order
11. Facial measurements - Interpupillary distance measurement and measuring heights (single vision, multifocal, progressives)
12. Lens verification and axis marking and fitting of all lens types
13. Final checking of finished spectacle with frame adjustments
14. Delivery and follow-up
15. Troubleshooting complaints and handling patient's questions

| Sl. No | Topics | No. of Lectures |
|--------|--|-----------------|
| 1. | Spectacle Lenses - II: <ul style="list-style-type: none"> • Manufacture of glass • Lens materials • Lens surfacing • Principle of surface generation and glass cement • Terminology used in Lens workshop • Lens properties • Lens quality • Faults in lens material • Faults on lens surface • Methods of Inspecting the quality of lenses • Safety standards for ophthalmic lenses (FDA, ANSI, ISI, Others) | 3 |
| 2. | Spectacle Frames: <ul style="list-style-type: none"> • Types and parts • Classification of spectacle frames-material, weight, temple position, Coloration • Frame construction • Frame selection • Size, shape, mounting and field of view of ophthalmic lenses | 3 |
| 3. | Tinted & Protective Lenses <ul style="list-style-type: none"> • Characteristics of tinted lenses Absorptive Glasses • Polarizing Filters, Photochromic & Reflecting filters • Safety lenses-Toughened lenses, Laminated Lenses, CR 39, Polycarbonate lenses | 3 |



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| | | |
|------------------------------|---|-----------|
| 4. | Multifocal Lenses: <ul style="list-style-type: none"> • Introduction, history and development, types • Bifocal lenses, Trifocal & Progressive addition lenses | 3 |
| 5. | Reflection from spectacle lens surface & lens coatings: <ul style="list-style-type: none"> • Reflection from spectacle lenses - ghost images - Reflections in bifocals at the dividing line • Antireflection coating, Mirror coating, Hard Multi Coating [HMC], Hydrophobic coating | 3 |
| 6. | Miscellaneous Spectacle: <ul style="list-style-type: none"> • Iseikonic lenses • Spectacle magnifiers • Recumbent prisms • Fresnel prism and lenses • Lenticular & Aspherical lenses • High Refractive index glasses | 3 |
| Total number of hours | | 18 |

Dispensing Optics:

| Sl. No. | Topic | No. of Lectures |
|---------|--|-----------------|
| 1 | Components of spectacle prescription & interpretation, transposition, Add and near power relation | 3 |
| 2 | Frame selection –based on spectacle prescription, professional requirements, age group, face shape | 2 |
| 3 | Measuring Inter-pupillary distance (IPD) for distance & near, bifocal height | 3 |
| 4 | Lens & Frame markings, Pupillary centers, bifocal heights, Progressive markings & adjustments –facial wrap, pantoscopic tilt | 3 |
| 5 | Recording and ordering of lenses (power, add, diameter, base, material, type, lens enhancements) | 2 |
| 6 | Neutralization –Hand & lensometer, axis marking, prism marking | 3 |
| 7 | Faults in spectacles (lens fitting, frame fitting, patients complaints, description, detection and correction) | 3 |
| 8 | Final checking & dispensing of spectacles to customers, counseling on wearing & maintaining of spectacles, Accessories –Bands, chains, boxes, slevets, cleaners, screwdriver kit | 3 |
| 9 | Spectacle repairs –tools, methods, soldering, riveting, frame adjustments | 3 |
| 10 | Special types of spectacle frames <ul style="list-style-type: none"> ➤ Monocles ➤ Ptosis crutches ➤ Industrial safety glasses | 3 |



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| | | |
|----|--|-----------|
| | ➤ Welding glasses | |
| 11 | Frame availability in Indian market | 1 |
| 12 | FAQ's by customers and their ideal answers | 1 |
| | Total number of Hours | 30 |

Course Name: Ophthalmic Lens and Dispensing Optics – II Practical
 Course Code: BOPC402

| | | | | | |
|----------------------------------|-----------------------|-----------|------------------|-----------|-------------|
| Course Type: Core (Practical) | Course Details: CC-19 | | L-T-P: 0 - 0 - 4 | | |
| Credit: 2 | Full Marks: 100 | CA Marks | | ESE Marks | |
| | | Practical | Theoretical | Practical | Theoretical |
| | | 60 | .... | 40 | ..... |

| Sl. No. | Topic | No. of Practical D+P* |
|---------|--|-----------------------|
| 1. | Frame selection –based on spectacle prescription, professional requirements, age group, face shape | 2 + 2 |
| 2. | Measuring Inter-pupillary distance (IPD) for distance & near, bifocal height | 2 + 2 |
| 3. | Lens & Frame markings, Pupillary centers, bifocal heights, Progressive markings & adjustments –facial wrap, pantoscopic tilt | 2 + 2 |
| 4. | Recording and ordering of lenses (power, add, diameter, base, material, type, lens enhancements) | 2 + 2 |
| 5. | Neutralization –Hand & lensometer, axis marking, prism marking | 2 + 2 |
| 6. | Faults in spectacles (lens fitting, frame fitting, patients complaints, description, detection and correction) | 4 + 4 |
| 7. | Final checking & dispensing of spectacles to customers, counseling on wearing & maintaining of spectacles, Accessories –Bands, chains, boxes, slevets, cleaners, screwdriver kit | 2 + 2 |
| 8. | Spectacle repairs –tools, methods, soldering, riveting, frame adjustments | 2 + 2 |
| 9. | Special types of spectacle frames ➤ Monocles ➤ Ptosis crutches ➤ Industrial safety glasses ➤ Welding glasses | 2 + 2 |



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| | | |
|-----|--|-----------|
| 10. | Frame availability in Indian market | 2 + 2 |
| 11. | FAQ's by customers and their ideal answers | 2 + 2 |
| | Total number of Hours | 48 |

* **D - Demonstration & P - Practice**

Text Book:

1. Jalie MO: Ophthalmic lens and Dispensing, 3rd edition, Butterworth – Heinemann, 2008
2. Troy E. Fannin, Theodore Grosvenor: Clinical Optics, 2nd edition, Butterworth – Heinemann, 1996

Reference Books:

1. C W Brooks, IM Borish: System for Ophthalmic Dispensing, 3rd edition, Butterworth - Heinemann, 2007
2. Michael P Keating: Geometric, Physical & Visual Optics, 2nd edition, Butterworth – Heinemann, 2002

Course Name: Visual Optics – II
Course Code: BOPC403

| | | | | | |
|------------------------------------|-----------------------|-----------|------------------|-----------|-------------|
| Course Type: Core (Theoretical) | Course Details: CC-20 | | L-T-P: 4 - 0 - 0 | | |
| Credit: 4 | Full Marks: 100 | CA Marks | | ESE Marks | |
| | | Practical | Theoretical | Practical | Theoretical |
|  |  | .... | 30 | .... | 70 |

Course Objectives: Upon completion of the course, the student should be able:

1. To understand the fundamentals of optical components of the eye
2. To gain theoretical knowledge and practical skill on visual acuity measurement, objective and subjective clinical refraction.

| Sl. No | Topics | No. of Lectures |
|--------|--------|-----------------|
|--------|--------|-----------------|



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| | | |
|----|--|------------|
| 1. | <p>Accommodation & Presbyopia</p> <ul style="list-style-type: none"> • Far and near point of accommodation • Range and amplitude of accommodation • Mechanism of accommodation • Variation of accommodation with age • Anomalies of accommodation • Presbyopia • Hypermetropia and accommodation | 6 |
| 2. | <p>Convergence:</p> <ul style="list-style-type: none"> • Type, Measurement and Anomalies • Relationship between accommodation and convergence-AC/A ratio | 4 |
| 3. | <p>Objective Refraction (Static & Dynamic)</p> <ul style="list-style-type: none"> • Streak retinoscopy • Principle, Procedure, Difficulties and interpretation of findings • Transposition and spherical equivalent • Dynamic retinoscopy various methods • Radical retinoscopy and near retinoscopy • Cycloplegic refraction | 8 |
| 4. | <p>Subjective Refraction:</p> <ul style="list-style-type: none"> • Principle and fogging • Fixed astigmatic dial(Clock dial),Combination of fixed and rotator dial(Fan and blocktest), J.C.C • Duochrome test <ul style="list-style-type: none"> ○ Binocular balancing- alternate occlusion, prism dissociation, dissociate Duochrome balance, Borish dissociated fogging ○ Binocular refraction-Variou techniques | 6 |
| 5. | <p>Effective Power & Magnification :</p> <ul style="list-style-type: none"> • Ocular refraction vs. Spectacle refraction • Spectacle magnification vs. Relative spectacle magnification • Axial vs. Refractive ametropia, Knapp'slaw • Ocular accommodation vs. Spectacle accommodation • Retinal image blur-Depth of focus and depth of field | 4 |
| 6 | <p>Objective Refraction (Static & Dynamic) – Practice</p> <ul style="list-style-type: none"> • Streak retinoscopy • Principle, Procedure, Difficulties and interpretation of findings • Transposition and spherical equivalent • Dynamic retinoscopy various methods • Radical retinoscopy and near retinoscopy • Cycloplegic refraction | 10P |



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| | | |
|------------------------------|--|------------|
| 7 | Subjective Refraction: Practice <ul style="list-style-type: none"> • Principle and fogging • Fixed astigmatic dial(Clock dial),Combination of fixed and rotator dial(Fan and block test),J.C.C • Duochrome test <ul style="list-style-type: none"> ○ Binocular balancing- alternate occlusion, prism dissociation, dissociate Duochrome balance, Borish dissociated fogging • Binocular refraction-Variou techniques | 10P |
| Total number of hours | | 48 |

Text Book:

1. Theodore Grosvenor: Primary Care Optometry, 5th edition, Butterworth –Heinemann, 2007
2. Duke –Elder’s practice of Refraction
3. AI Lens: Optics, Retinoscopy, and Refractometry: 2nd edition, SLACK Incorporated (p) Ltd, 2006

Reference Books:

1. George K. Hans, Kenneth Cuiffreda: Models of the visual system, Kluwer Academic, NY, 2002
2. Leonard Werner, Leonard J. Press: Clinical Pearls in Refractive Care, Butterworth – Heinemann,2002
3. David B. Elliot: Clinical Procedures in Primary Eye care, 3rd edition, Butterworth – Heinemann,2007
4. WJ Benjamin: Borish’s clinical refraction,2nd edition, Butterworth Heinemann, Missouri,USA,2006

Course Name: Ocular Disease – II
 Course Code: BOPC404

| | | | | | |
|------------------------------------|-----------------------|-----------|------------------|-----------|-------------|
| Course Type: Core (Theoretical) | Course Details: CC-21 | | L-T-P: 4 - 0 - 0 | | |
| Credit: 4 | Full Marks: 100 | CA Marks | | ESE Marks | |
| | | Practical | Theoretical | Practical | Theoretical |
|  |  | .... | 30 | .... | 70 |

Course Objectives: At the end of the course the students will be knowledgeable in the following aspects of ocular diseases: knowledge on

1. Etiology
2. Epidemiology
3. Symptoms
4. Signs



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5. Course sequelae of ocular disease
6. Diagnostic approach, and
7. Management of the ocular diseases.

| Sl. No | Topics | No. of Lectures |
|--------|---|-----------------|
| 1. | Retina and Vitreous: <ul style="list-style-type: none"> • Congenital and Developmental Disorders • Inflammatory disorders • 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 | 10 |
| 2. | Ocular Injuries: Terminology : Closed globe injury (contusion, lamellar laceration) Open globe injury (rupture, laceration, penetrating injury, perforating injury) <ul style="list-style-type: none"> • Mechanical injuries (Extraocular foreign body, blunt trauma, perforating injury, sympatheticophthalmitis) • Non Mechanical Injuries (Chemical injuries, Thermal, Electrical, Radiational) • Clinical approach towards ocular injury patients | 10 |
| 3. | Lens <ul style="list-style-type: none"> • Clinical examination • Classification of cataract • Congenital and Developmental cataract • Acquired (Senile, Traumatic, Complicated, Metabolic, Electric, Radiational, Toxic) • Morphological: Capsular, Subcapsular, Cortical, Supranuclear, Nuclear, Polar. • Management of cataract (Non-surgical and surgical measures; preoperative evaluation, Types of surgeries,) • Complications of cataract surgery • Displacement of lens: Subluxation, Displacement • Lens coloboma, Lenticonus, Microspherophakia. | 10 |
| 4. | Clinical Neuro-ophthalmology | 10 |



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| | | |
|------------------------------|--|-----------|
| | <ul style="list-style-type: none"> • 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 examination | |
| 5. | Glaucoma <ul style="list-style-type: none"> • 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 | 8 |
| Total number of hours | | 48 |

Text Book:

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

Reference Books:

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



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Course Name: Geriatric Optometry and Pediatric Optometry
 Course Code: BOPC405

| | | | | | |
|------------------------------------|-----------------------|-----------|------------------|-----------|-------------|
| Course Type: Core (Theoretical) | Course Details: CC-22 | | L-T-P: 4 - 0 - 0 | | |
| Credit: 4 | Full Marks: 100 | CA Marks | | ESE Marks | |
| | | Practical | Theoretical | Practical | Theoretical |
|  |  | .... | 30 | .... | 70 |

Course Objectives: The student on taking this course should

1. Be able to identify, investigate the age related changes in the eyes.
2. Be able to counsel the elderly
3. Be able to dispense spectacles with proper instructions.
4. Adequately gained knowledge on common ocular diseases.

| Sl. No | Topics | No. of Lectures |
|--------|--|-----------------|
| 1. | Structural , and morphological changes of eye in elderly | 2 |
| 2. | Physiological changes in eye in the course of aging. | 2 |
| 3. | Introduction to geriatric medicine – epidemiology , need for optometry care, systemic diseases (Hypertension, Atherosclerosis, coronary heart disease, congestive Heart failure, Cerebro vascular disease, Diabetes, COPD) | 4 |
| 4. | Optometric Examination of the Older Adult | 2 |
| 5. | Ocular diseases common in old eye, with special reference to cataract, glaucoma, macular disorders, vascular diseases of the eye | 2 |
| 6. | Contact lenses in elderly | 2 |
| 7. | Pharmacological aspects of aging | 2 |
| 8. | Low vision causes, management and rehabilitation in geriatrics. | 2 |
| 9. | Spectacle dispensing in elderly – Considerations of spectacle lenses and frames | 2 |
| 10. | The Development of Eye and Vision | 2 |
| 11. | History taking Pediatric subjects | 2 |
| 12. | Assessment of visual acuity | 4 |
| 13. | Normal appearance, pathology and structural anomalies of | 2 |
| 14. | Orbit, Eye lids, Lacrimal system, | 2 |
| 15. | Conjunctiva, Cornea, Sclera Anterior chamber, Uveal tract, Pupil | 2 |



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| | | |
|------------------------------|--|-----------|
| 16. | lens, vitreous, Fundus Oculo motor system | 2 |
| 17. | refractive Examination | 2 |
| 18. | determining binocular status | 2 |
| 19. | determining sensory moto adaptability | 2 |
| 20. | compensatory treatment and remedial therapy for : Myopia, Pseudomyopia, Hyperopia, Astigmatism, Anisometropia, Amblyopia | 2 |
| 21. | remedial and Compensatory treatment of Strabismus and Nystagmus | 4 |
| Total number of hours | | 48 |

Text Books:

1. J. ROSSENBLOOM Jr & M.W.MORGAN: Vision and Aging, Butterworth- Heinemann, Missouri, 2007.

Reference Books:

1. OP Sharma: Geriatric Care –A textbook of geriatrics and Gerontology, viva books, New Delhi,2005
2. VS Natarajan: An update on Geriatrics, Sakthi Pathipagam, Chennai,1998
3. DE Rosenblatt, VS Natarajan: Primer on geriatric Care A clinical approach to the older patient, Printers Castle, Cochin,2002

Course Name: Basic and Ocular Pharmacology

Course Code: BOPC406

| | | | | | |
|------------------------------------|-----------------------|-----------|------------------|-----------|-------------|
| Course Type: Core (Theoretical) | Course Details: CC-23 | | L-T-P: 3 - 0 - 0 | | |
| Credit: 4 | Full Marks: 100 | CA Marks | | ESE Marks | |
| | | Practical | Theoretical | Practical | Theoretical |
|  |  | .... | 30 | .... | 70 |

Course Objectives: At the end of the course the students will acquire knowledge in the following aspects-

1. Basic principle of pharmacokinetics & Pharmacodynamics
2. Commonly used ocular drugs, mechanism, indications, contraindications, drug dosage and adverse effects.

| Sl. No | Topics | No. of Lectures |
|--------|--------|-----------------|
|--------|--------|-----------------|



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| | | |
|------------------------------|---|-----------|
| 1. | General Pharmacology: Introduction & sources of drugs, Routes of drug administration, Pharmacokinetics (emphasis on ocular pharmacokinetics), Pharmacodynamics & factors modifying drug actions | 6 |
| 2. | Systemic Pharmacology: Autonomic nervous system: Drugs affecting papillary size and light reflex, Intraocular tension, Accommodation; Cardiovascular system: Anti- hypertensive sand drugs useful in Angina; Diuretics: Drugs used in ocular disorders; Central Nervous System: Alcohol, sedative hypnotics, General & local anaesthetics, Opioids & non-opioids; Chemotherapy : Introduction on general chemotherapy, Specific chemotherapy –Antiviral, antifungal, antibiotics; Hormones : Corticosteroids, Antidiabetics; Blood Coagulants | 12 |
| 3. | Ocular Pharmacology: Ocular preparations, formulations and requirements of an ideal agent; Ocular Pharmacokinetics, methods of drug administration & Special drug delivery system; Ocular Toxicology | 6 |
| 4. | Diagnostic & Therapeutic applications of drugs used in Ophthalmology: Diagnostic Drugs & biological agents used in ocular surgery, Anesthetics used in ophthalmic procedures, Anti-glaucoma drugs; Pharmacotherapy of ocular infections –Bacterial, viral, fungal & chlamydial; Drugs used in allergic, inflammatory& degenerative conditions of the eye; Immune modulators in Ophthalmic practice, Wetting agents & tear substitutes, Antioxidants | 12 |
| Total number of hours | | 36 |

Text Book:

1. K D Tripathi: Essentials of Medical Pharmacology. 5th edition, Jaypee, New Delhi,2004

Reference Books:

1. Ashok Garg: Manual of Ocular Therapeutics, Jaypee, New Delhi,1996
2. T J Zimmerman, K S Kooner : Text Book of Ocular Pharmacology, Lippincott-Raven,1997



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Course Name: Clinical Optometry – II
 Course Code: BOPC407

| | | | | | |
|----------------------------------|-----------------------|-----------|------------------|-----------|-------------|
| Course Type: Core (Practical) | Course Details: CC-24 | | L-T-P: 0 - 0 - 4 | | |
| Credit: 2 | Full Marks: 100 | CA Marks | | ESE Marks | |
| | | Practical | Theoretical | Practical | Theoretical |
| | | 60 | .... | 40 | ..... |

Course Objectives:

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

| No. | Topics | No. of Practical D + P* |
|-----|--|----------------------------|
| 1 | addox Rod | 4 + 4 |
| 2 | an Herrick | 5 + 5 |
| 3 | external examination of the eye, Lid Eversion | 5 + 5 |
| 4 | chirmer's, TBUT, tear meniscus level, NITBUT (keratometer), | 5 + 5 |
| 5 | olor Vision | 5 + 5 |
| | Total | 48 |

*** D - Demonstration & P - Practice**



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Semester – V

| Course Code | Course Name | L - T - P | Credits | Total Marks |
|--------------|---|-----------|-----------|-------------|
| BOPC501 | Contact lens – I | 4-0-0 | 4 | 100 |
| BOPC502 | Contact lens – I Practical | 0-0-4 | 2 | 100 |
| BOPC503 | Low Vision and Rehabilitation | 4-0-0 | 4 | 100 |
| BOPC504 | Low Vision and Rehabilitation Practical | 0-0-4 | 2 | 100 |
| BOPC505 | Systemic Disease | 4-0-0 | 4 | 100 |
| BOPC506 | Clinical Optometry – III | 0-0-4 | 2 | 100 |
| BOPSE501 | Research Methodology and Biostatistics | 3-1-0 | 4 | 100 |
| TOTAL | | | 22 | 900 |

| Course Code | Course Name | L -T -P | Credits | Total Marks |
|-------------|--------------------|---------|---------|-------------|
| BOPC501 | CONTACT LENSES – I | 4-0-0 | 4 | 100 |

COURSE OBJECTIVES: Upon completion of the course, the student should be able to:

1. Understand the basics of contact lenses
2. List the important properties of contact lenses
3. Finalise the CL design for various kinds patients
4. Recognize various types of fitting
5. Explain all the procedures to patient
6. Identify and manage the adverse effects of contact lens

PREREQUISITES: Geometrical optics, Visual optics, Ocular Anatomy, Ocular Physiology, Biochemistry, Ocular Microbiology, Ocular Disease, Optometric Instruments



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| No. | Topics | No of hrs. |
|-----|--|------------|
| 1 | Introduction to Contact lenses: Definition, Classification / Types. History of Contact Lenses. Optics of Contact Lenses: Magnification & Visual field, Accommodation & Convergence, Back & Front Vertex Power / Vertex distance calculation. Review of Anatomy & Physiology of Tear film, Cornea, Lids & Conjunctiva | 6 |
| 2 | Introduction to CL materials: Monomers, Polymers, Properties of CL materials: Physiological (Dk, Ionicity, Water content), Physical (Elasticity, Tensile strength, Rigidity), Optical (Transmission, Refractive index), Indications and contraindications, Parameters / Designs of Contact Lenses & Terminology | 10 |
| 3 | RGP Contact Lens materials, Manufacturing Rigid and Soft Contact Lenses – various methods, Pre-Fitting examination – steps, significance, recording of results, Correction of Astigmatism with RGP lens. Types of fit – Steep, Flat, Optimum – on spherical cornea with spherical lenses. Types of fit – Steep, Flat, Optimum – on Toric cornea with spherical lenses. Calculation and finalising Contact lens parameters. | 12 |
| 4 | Ordering Rigid Contact Lenses – writing a prescription to the Laboratory. Checking and verifying Contact lenses from Laboratory. Modifications possible with Rigid lenses. Common Handling Instructions: Insertion & Removal Techniques, Do's and Dont's | 10 |
| 5 | Care and Maintenance of Rigid lenses: Cleaning agents & Importance, Rinsing agents & Importance, Disinfecting agents & importance, Lubricating & Enzymatic cleaners. Follow up visit examination. Complications of RGP lenses | 10 |
| | Total | 48 |

TEXT BOOKS:

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



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| Course Code | Course Name | L -T -P | Credits | Total Marks |
|-------------|------------------------------|---------|---------|-------------|
| BOPC502 | CONTACT LENSES I - Practical | 0-0-4 | 2 | 100 |

| No. | Topics | No of hrs. |
|-----|--|------------|
| 1 | Measurement of Ocular dimensions | 2 |
| 2 | Pupillary diameter and lid characteristics | 2 |
| 3 | Blink rate and TBUT | 2 |
| 4 | Schrimers test, Slit lamp examination of tear layer | 6 |
| 5 | Keratometry | 4 |
| 6 | Placido's disc | 2 |
| 7 | Lens insertion and removal | 2 |
| 8 | Lens handling and cleaning | 2 |
| 9 | Examination of old soft Lens | 2 |
| 10 | RGP Lens fitting | 6 |
| 11 | RGP Lens Fit Assessment and fluorescein pattern | 6 |
| 12 | Special RGP fitting (Aphakia, pseudo phakia & Keratoconus) | 6 |
| 13 | RGP over refraction and Lens flexure | 1 |
| 14 | Examination of old RGP Lens | 1 |
| 15 | RGP Lens parameters | 2 |
| 16 | Slit lamp examination of Contact Lens wearers | 2 |
| | Total | 48 |

| Course Code | Course Name | L -T -P | Credits | Total Marks |
|-------------|-----------------------------|---------|---------|-------------|
| BOPC503 | LOW VISION & REHABILITATION | 4-0-0 | 4 | 100 |

COURSE OBJECTIVES: At the end of the course, the student will be knowledgeable in the following:

1. Definition and epidemiology of Low Vision
2. Clinical examination of Low vision subjects
3. Optical, Non-Optical, Electronic, and Assistive devices.
4. Training for Low Vision subjects with Low vision devices
5. Referrals and follow-up



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| No. | Topics | No of hrs. |
|-----|--|------------|
| 1 | Definitions & classification of Low vision | 4 |
| 2 | Epidemiology of low vision | 4 |
| 3 | Model of low vision service | 4 |
| 4 | Pre-clinical evaluation of low vision patients – prognostic & psychological factors; psycho- social impact of low vision | 4 |
| 5 | Types of low vision aids – optical aids, non-optical aids & electronic devices | 4 |
| 6 | Optics of low vision aids | 4 |
| 7 | Clinical evaluation – assessment of visual acuity, visual field, selection of low vision aids, instruction & training | 4 |
| 8 | Pediatric Low Vision care | 4 |
| 9 | Low vision aids – dispensing & prescribing aspects | 4 |
| 10 | Visual rehabilitation & counseling | 4 |
| 11 | Legal aspects of Low vision in India | 4 |
| 12 | Case Analysis | 4 |
| | Total | 48 |

TEXT BOOKS:

1. Christine Dickinson: Low Vision: Principles and Practice Low vision care, 4th edition, Butterworth-Heinemann, 1998
2. Sarika G, Sailaja MVSE Vaithilingam: practice of Low vision –A guide book, Medical Research Foundation, 2015.

REFERENCE BOOKS:

1. [Richard L. Brilliant](#): Essentials of Low Vision Practice, Butterworth-Heinemann, 1999
2. Helen Farral: optometric Management of Visual Handicap, Blackwell Scientific publications, 1991
3. A J Jackson, J S Wolffsohn: Low Vision Manual, Butterworth Heinemann, 2007

| Course Code | Course Name | L -T -P | Credits | Total Marks |
|-------------|---|---------|---------|-------------|
| BOPC504 | LOW VISION & REHABILITATION - Practical | 0-0-4 | 2 | 100 |



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| No. | Topics | No of hrs. |
|-----|--|------------|
| 1 | Practical 1: Attending in low vision care clinic and history taking. | 16 |
| 2 | Practical 2: 2.1 Determining the type of telescope and its magnification (Direct comparison method & calculated method) 2.2 Determining the change in field of view with different magnification and different eye to lens distances with telescopes and magnifiers. | 16 |
| 3 | Practical 3: 3.1 Inducing visual impairment and prescribing magnification. 3.2 Determining reading speed with different types of low vision aids with same magnification. 3.3 Determining reading speed with a low vision aid of different magnifications. | 16 |
| | TOTAL | 48 |

| Course Code | Course Name | L -T -P | Credits | Total Marks |
|-------------|-------------------|---------|---------|-------------|
| BOPC505 | SYSTEMIC DISEASES | 3-1-0 | 4 | 100 |

PREREQUISITES: Ocular anatomy, Physiology

COURSE OBJECTIVES: At the end of the course, students should get acquainted with the following:

1. Common Systemic conditions: Definition, diagnostic approach, complications and management options
2. Ocular findings of the systemic conditions
3. First Aid knowledge

| No. | Topics | No of hrs. |
|-----|--------------|------------|
| 1 | Hypertension | 3 |



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| | | |
|----|---|---|
| | 1.1 Definition, classification, Epidemiology, clinical examination, complications, and management. 1.2 Hypertensive retinopathy | |
| 2 | Diabetes Mellitus 2.1 Classification, pathophysiology, clinical presentations, diagnosis, and management, Complications 2.2 Diabetic Retinopathy | 3 |
| 3 | Thyroid Disease 3.1 Physiology, testing for thyroid disease, Hyperthyroidism, Hypothyroidism, Thyroiditis, Thyroid tumors 3.2 Grave's Ophthalmopathy | 3 |
| 4 | 1 Acquired Heart Disease 4.1 Ischemic Heart Disease, Congestive heart failure, Disorders of cardiac rhythm 4.2 Ophthalmic considerations | 3 |
| 5 | Cancer : 5.1 Incidence 5.2 Etiology 5.3 Therapy 5.4 Ophthalmologic considerations | 3 |
| 6 | Connective Tissue Disease 6.1 Rheumatic arthritis 6.2 Systemic lupus erythematosus 6.3 Scleroderma 6.4 Polymyositis and dermatomyositis 6.5 Sjogren syndrome 6.6 Behcet's syndrome 6.7 Eye and connective tissue disease | 3 |
| 7 | Tuberculosis 7.1 Aetiology, pathology, clinical features, pulmonary tuberculosis, diagnosis, complications, treatment tuberculosis and the eye. | 3 |
| 8 | Herpes virus (Herpes simplex, Varicella Zoster, Cytomegalovirus, Epstein Barr Virus) 8.1 Herpes and the eye | 3 |
| 9 | Hepatitis (Hepatitis A, B, C) | 3 |
| 10 | Acquired Immunodeficiency Syndrome | 2 |
| 11 | Anemia (Diagnosis, clinical evaluation, consequences, Sickle cell disease, treatment, Ophthalmologic considerations) | 3 |
| 12 | .Common Tropical Medical Ailments 12.1 Malaria 12.2 Typhoid 12.3 Dengue | 3 |



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|----|---|-----------|
| | 12.4 Filariases 12.5 Onchocerciasis 12.6 Cysticercosis 12.7 Leprosy | |
| 13 | Nutritional and Metabolic disorders: 13.1 Obesity 13.2 Hyperlipidaemias 13.3 Kwashiorkor 13.4 Vitamin A Deficiency 13.5 Vitamin D Deficiency 13.6 Vitamin E Deficiency 13.7 Vitamin K Deficiency 13.8 Vitamin B1, B2, Deficiency 13.9 Vitamin C Deficiency | 3 |
| 14 | Myasthenia Gravis | 1 |
| 15 | First Aid General Medical Emergencies Preoperative precautions in ocular surgeries | 3 |
| 16 | Psychiatry Basic knowledge of psychiatric condition and Patient Management | 3 |
| 17 | Genetics 17.1 Introduction to genetics 17.2 Organisation of the cell 17.3 Chromosome structure and cell division 17.4 Gene structure and basic principles of Genetics. 17.5 Genetic disorders and their diagnosis. 17.6 Genes and the eye 17.7 Genetic counseling and genetic engineering. | 3 |
| | Total | 48 |

TEXT BOOKS:

1. 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
2. Basic and clinical Science course: Update on General Medicine,
American Academy of Ophthalmology, Section 1, 1999

| Course Code | Course Name | L -T -P | Credits | Total Marks |
|-------------|-------------|---------|---------|-------------|
|-------------|-------------|---------|---------|-------------|



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|----------|--|-------|---|-----|
| BOPSE501 | RESEARCH METHODOLOGY AND BIOSTATISTICS | 3-1-0 | 4 | 100 |
|----------|--|-------|---|-----|

PREREQUISITES: Pass human anatomy

COURSE OBJECTIVES: The objective of this module is to help the students understand the basic principles of research and methods applied to draw inferences from the research findings.

| No. | Topics | No of hrs. |
|----------|--|------------|
| A | RESEARCH METHODOLOGY | |
| 1 | Introduction to research methods | |
| 2 | Identifying research problem | 3 |
| 3 | Ethical issues in research | 3 |
| 4 | Research design | 3 |
| 5 | Types of Data | 3 |
| 6 | Research tools and Data collection methods | 3 |
| 7 | Sampling methods | 3 |
| 8 | Developing a research proposal | 3 |
| B | BIOSTATISTICS | |
| 1 | Basics of Biostatistics 1.1 Introduction of Biostatistics 1.2 Measures of Morality 1.3 Sampling 1.4 Statistical significance 1.5 Correlation 1.6 Sample size determination. 1.7 Statistics –Collection of Data - presentation including classification and diagrammatic representation –frequency distribution. Measures of central tendency; measures of dispersion. 1.8 Theoretical distributions. 1.8.1 Binomial 1.8.2 Normal 1.8.3 Sampling –necessity of methods and techniques. 1.8.4 Chi. Square test (2 x 2) | 12 |
| 2 | Hospital Statistics | 6 |
| 3 | Use of computerized software for statistics | 6 |



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| Total | 48 |
|--------------|-----------|

TEXT BOOKS:

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

| Course Code | Course Name | L -T -P | Credits | Total Marks |
|-------------|--------------------------|---------|---------|-------------|
| BOPC506 | CLINICAL OPTOMETRY - III | 0-0-4 | 2 | 100 |

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

| No. | Topics | No of hrs. |
|-----|--|------------|
| 1 | History taking | |
| 2 | Visual acuity estimation | |
| 3 | Extraocular motility, Cover teat, Alternating cover test | |
| 4 | Hirschberg test, Modified Krimsky | |
| 5 | Pupils Examination | |
| 6 | Maddox Rod | |
| 7 | Van Herrick | |
| 8 | External examination of the eye, Lid Eversion | |
| 9 | Schirmer's, TBUT, tear meniscus level, NITBUT (keratometer), | |
| 10 | Color Vision | |
| 11 | Stereopsis | 8 |
| 12 | Confrontation test | 10 |
| 13 | Photostress test | 10 |



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|----|------------------------------------|-----------|
| 14 | Slit lamp biomicroscopy | 10 |
| 15 | Ophthalmoscopy | 10 |
| 16 | Tonometry | |
| 17 | ROPLAS | |
| 18 | Amsler test | |
| 19 | Contrast sensitivity function test | |
| 20 | Saccades and pursuit test | |
| | Total | 48 |



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Semester VI

| Course Code | Course Name | L -T -P | Credits | Total Marks |
|-------------|------------------|---------|---------|-------------|
| BOPC601 | CONTACT LENS -II | 4-0-0 | 4 | 100 |

COURSE OBJECTIVES: Upon completion of the course, the student should be able to:

1. Understand the basics of contact lenses
2. List the important properties of contact lenses
3. Finalise the CL design for various kinds patients
4. Recognize various types of fitting
5. Explain all the procedures to patient
6. Identify and manage the adverse effects of contact lens

| No. | Topics | No of hrs. |
|-----|--|------------|
| 1 | SCL Materials & Review of manufacturing techniques | 3 |
| 2 | Comparison of RGP vs. SCL | 3 |
| 3 | Pre-fitting considerations for SCL | 3 |
| 4 | Fitting philosophies for SCL | 4 |
| 5 | Fit assessment in Soft Contact Lenses: Types of fit – Steep, Flat, Optimum | 4 |
| 6 | Calculation and finalising SCL parameters 6.1 Disposable lenses 6.2 Advantages and availability | 3 |
| 7 | Soft Toric CL 7.1 Stabilization techniques 7.2 Parameter selection 7.3 Fitting assessment | 6 |
| 8 | Common Handling Instructions 8.1 Insertion & Removal Techniques 8.2 Do's and Dont's | 3 |
| 9 | Care and Maintenance of Soft lenses 9.1 Cleaning agents & Importance 9.2 Rinsing agents & Importance 9.3 Disinfecting agents & importance 9.4 Lubricating & Enzymatic cleaners | 3 |



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| | | |
|----|--|-----------|
| 10 | Follow up visit examination | 3 |
| 11 | Complications of Soft lenses | 3 |
| 12 | Therapeutic contact lenses 12.1 Indications 12.2 Fitting consideration | 3 |
| 13 | Specialty fitting 13.1 Aphakia 13.2 Pediatric Post refractive surgery | 4 |
| 14 | Management of Presbyopia with Contact lenses | 3 |
| | Total | 48 |

TEXT BOOKS:

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

| Course Code | Course Name | L -T -P | Credits | Total Marks |
|-------------|----------------------------|---------|---------|-------------|
| BOPC602 | CONTACT LENS -II Practical | 0-0-4 | 2 | 100 |

| No. | Topics | No of hrs. |
|-----|---|------------|
| 1 | Examination of old soft Lens | 5 |
| 2 | Soft Contact Lens fitting – Hydrogel | 7 |
| 3 | Soft Contact Lens fitting – SiliconHydrogel | 6 |
| 4 | Soft Contact Lens over refraction | 5 |
| 5 | Fitting Cosmetic Contact Lens | 5 |
| 6 | Slit lamp examination of Contact Lens wearers | 5 |
| 7 | Fitting Toric Contact Lens | 5 |
| 8 | Bandage Contact Lens | 5 |
| 9 | SPM & Pachymetry at During Clinics | 5 |
| | Total | 48 |



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| Course Code | Course Name | L -T -P | Credits | Total Marks |
|-------------|---------------------------------|---------|---------|-------------|
| BOPC603 | Binocular Vision and Orthoptics | 4-0-0 | 4 | 100 |

COURSE OBJECTIVES: The objective of this course is to inculcate the student with the knowledge of different types of strabismus its etiology signs and symptoms, necessary investigations and also management. The student on completion of the course should be able to independently investigate and diagnose case of strabismus with comments in respect to retinal correspondence and binocular single vision. The student should be able to perform all the investigations to check retinal correspondence, state of Binocular Single Vision, angle of deviation and special investigations for paralytic strabismus.

| No. | Topics | No of hrs. |
|-----|---|------------|
| 1 | Neuro-muscular anomalies 1.1 Classification and etiological factors | 3 |
| 2 | History – recording and significance. | 2 |
| 3 | Convergent strabismus 3.1 Accommodative convergent squint 3.1.1 Classification 3.1.2 Investigation and Management 3.2 Non accommodative Convergent squint 3.1.3 Classification 3.1.4 Investigation and Management | 4 |
| 4 | Divergent Strabismus 4.1 Classification 4.2 A & V phenomenon 4.3 Investigation and Management | 4 |
| 5 | Vertical strabismus 5.1 Classification 5.2 Investigation and Management | 4 |
| 6 | Paralytic Strabismus 6.1 Acquired and Congenital 6.2 Clinical Characteristics | 4 |
| 7 | Distinction from comitant and restrictive Squint | 4 |



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| | | |
|--------------|---|-----------|
| 8 | Investigations 8.1History and symptoms 8.2Head Posture 8.3Diplopia Charting 8.4Hess chart 8.5PBCT 8.6Nine directions 8.7Binocular field of vision | 4 |
| 9 | Amblyopia and Treatment of Amblyopia | 4 |
| 10 | Nystagmus | 3 |
| 11 | Non-surgical Management of Squint | 4 |
| 12 | Restrictive Strabismus 12.1Features 12.2Musculo-fascical anomalies 12.3Duane's Retraction syndrome 12.4Clinical features and management 12.5Brown's Superior oblique sheath syndrome 12.6Strabismus fixus 12.7Congenital muscle fibrosis | 4 |
| 13 | Surgical management | 4 |
| Total | | 48 |

TEXT BOOKS:

1. Pradeep Sharma: Strabismus simplified, New Delhi, First edition, 1999, Modern publishers.
2. Fiona J. Rowe: Clinical Orthoptics, second edition, 2004, Blackwell Science Ltd
3. 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
4. Mitchell Scheiman; Bruce Wick: Clinical Management of Binocular Vision Heterophoric, Accommodative, and Eye Movement Disorders, 2008, Lippincot Williams & Wilkins publishers

| Course Code | Course Name | L -T -P | Credits | Total Marks |
|-------------|-----------------------------------|---------|---------|-------------|
| BOPTO604 | BINOCULAR VISION -II Practical | 0-0-4 | 2 | 100 |



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| No. | Topics | No of hrs. |
|-----|--|------------|
| 1 | Convergent strabismus Investigation and Management | 6 |
| 2 | Divergent Strabismus Investigation and Management | 10 |
| 3 | Vertical strabismus Investigation and Management | 6 |
| 4 | Investigations 4.1History and symptoms 4.2Head Posture 4.3Diplopia Charting 4.4Hess chart 4.5PBCT 4.6Nine directions 4.7Binocular field of vision | 26 |
| | Total | 48 |

| Course Code | Course Name | L -T -P | Credits | Total Marks |
|-------------|---------------------------------------|---------|---------|-------------|
| BOPC605 | Public Health and Community Optometry | 4-0-0 | 4 | 100 |

COURSE OBJECTIVES: At the end of the course students will be be knowledgeable in the following areas:

1. Community based eye care in India.
2. Prevalence of various eye diseases
3. Developing Information Education Communication materials on eye and vision care for the benefit of the public
4. Organize health education programmes in the community
5. Vision screening for various eye diseases in the community and for different age groups.

| No. | Topics | No of hrs. |
|-----|--|------------|
| 1 | Public Health Optometry: Concepts and implementation, Stages of diseases | 6 |
| 2 | Dimensions, determinants and indicators of health | 2 |
| 3 | Levels of disease prevention and levels of health care patterns | 2 |
| 4 | Epidemiology of blindness – Defining blindness and visual impairment | 2 |



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| | | |
|----|--|-----------|
| 5 | Eye in primary health care | 2 |
| 6 | Contrasting between Clinical and community health programs | 2 |
| 7 | Community Eye Care Programs | 2 |
| 8 | Community based rehabilitation programs | 2 |
| 9 | Nutritional Blindness with reference to Vitamin A deficiency | 2 |
| 10 | Vision 2020: The Right to Sight | 2 |
| 11 | Screening for eye diseases | 2 |
| 12 | National and International health agencies, NPCB | 4 |
| 13 | Role of an optometrist in Public Health | 4 |
| 14 | Organization and Management of Eye Care Programs – Service Delivery models | 4 |
| 15 | Health manpower and planning & Health Economics | 2 |
| 16 | Evaluation and assessment of health programmes | 2 |
| 17 | Optometrists role in school eye health programmes | 2 |
| 18 | Basics of Tele Optometry and its application in Public Health | 2 |
| 19 | Information, Education and Communication for Eye Care programs | 2 |
| | Total | 48 |

TEXT BOOKS:

1. GVS Murthy, S K Gupta, D Bachani: The principles and practice of community Ophthalmology, National programme for control of blindness, New Delhi, 2002
2. Newcomb RD, Jolley JL : Public Health and Community Optometry, Charles C Thomas Publisher, Illinois, 1980
3. K Park: Park's Text Book of Preventive and Social Medicine, 19th edition,
4. Banarsidas Bhanot publishers, Jabalpur, 2007

REFERENCE BOOKS: MC Gupta, Mahajan BK, Murthy GVS, 3rd edition.
Text Book of Community Medicine, Jaypee Brothers, New Delhi, 2002

| Course Code | Course Name | L -T -P | Credits | Total Marks |
|-------------|------------------------|---------|---------|-------------|
| BOPC606 | OCCUPATIONAL OPTOMETRY | 4-0-0 | 4 | 100 |

COURSE OBJECTIVES: At the end of the course the students will be knowledgeable in the following aspects:



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1. In visual requirements of jobs;
2. In effects of physical, chemical and other hazards on eye and vision;
3. To identify occupational causes of visual and eye problems;
4. To be able to prescribe suitable corrective lenses and eye protective wear and
5. To set visual requirements, standards for different jobs.

| No. | Topics | No of hrs. |
|-----|--|------------|
| 1 | Introduction to Occupational health, hygiene and safety, international bodies like ILO, WHO, National bodies etc. 1.1 Acts and Rules - Factories Act, WCA, ESI Act. | 5 |
| 2 | Electromagnetic Radiation and its effects on Eye | 5 |
| 3 | Light – Definitions and units, Sources, advantages and disadvantages, standards | 5 |
| 4 | Color – Definition, Color theory, Color coding, Color defects, Color Vision tests | 5 |
| 5 | Occupational hazards and preventive/protective methods | 5 |
| 6 | Task Analysis | 5 |
| 7 | Industrial Vision Screening – Modified clinical method and Industrial Vision test | 5 |
| 8 | Vision Standards – Railways, Roadways, Airlines | 5 |
| 9 | Visual Display Units | 4 |
| 10 | Contact lens and work | 4 |
| | Total | 48 |

TEXT BOOKS:

1. PP Santanam, R Krishna kumar, Monica R. Dr. Santanam's text book of Occupational optometry. 1st edition, Published by Elite School of optometry , unit of Medical Research Foundation, Chennai, India , 2015
2. R V North: Work and the eye, Second edition, Butterworth Heinemann, 2001

REFERENCE BOOKS:

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



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| Course Code | Course Name | L -T -P | Credits | Total Marks |
|-------------|------------------------|---------|---------|-------------|
| BOPSE601 | Medical Law and Ethics | 4-0-0 | 4 | 100 |

Objective:

Legal and ethical considerations are firmly believed to be an integral part of medical practice in planning patient care. Advances in medical sciences, growing sophistication of the modern society's legal framework, increasing awareness of human rights and changing moral principles of the community at large, now result in frequent occurrences of healthcare professionals being caught in dilemmas over aspects arising from daily practice.

| No. | Topics | No of hrs. |
|-----|---|------------|
| 1 | Medical ethics - Definition - Goal - Scope b | 6 |
| 2 | Introduction to Code of conduct | 4 |
| 3 | Basic principles of medical ethics –Confidentiality | 4 |
| 4 | Malpractice and negligence - Rational and irrational drug therapy | 4 |
| 5 | Autonomy and informed consent - Right of patients | 4 |
| 6 | Care of the terminally ill- Euthanasia | 4 |
| 7 | Organ transplantation | 4 |
| 8 | Medico legal aspects of medical records –Medico legal case and type-Records and document related to MLC - ownership of medical records - Confidentiality Privilege communication - Release of medical information - Unauthorized disclosure - retention of medical records - other various aspects. | 6 |
| 9 | Professional Indemnity insurance policy | 4 |
| 10 | Development of standardized protocol to avoid near miss or sentinel events | 4 |
| 11 | Obtaining an informed consent. | 4 |
| | Total | 48 |



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SEM – VII and VIII

| | | | | | | | |
|------|------------------|---|---------|-------|--------|---|---|
| VII | Internship -I | C | BOPC701 | CC-38 | 0-0-12 | 6 | 9 |
| | Project Work -I | C | BOPC702 | CC-39 | 0-0- 6 | 3 | |
| | | | | | | | |
| VIII | Internship - II | C | BOPC801 | CC-40 | 0-0-12 | 6 | 9 |
| | Project Work -II | C | BOPC802 | CC-41 | 0-0-6 | 3 | |
| | | | | | | | |