GANDHI INSTITUTE OF TECHNOLOGY AND MANAGEMENT (GITAM)

(Deemed to be University)

VISAKHAPATNAM | HYDERABAD | BENGALURU

Accredited by NAAC with A^{++} Grade

Regulations and Syllabus of

B.Sc. OPTOMETRY

(W.e.f. 2024-2025 admitted batch)

B.Sc. OPTOMETRY

(Effective from 2024-25 Admitted batch)

ADMISSIONS

Admissions into B.Sc. Paramedical (Specialization in OPTOMETRY) program of GITAM (Deemed to be University) are governed by GITAM (Deemed to be University) admission regulations.

ELIGIBILITY CRITERIA

Eligibility:

1. He/she has passed the Higher Secondary (10+Z) or equivalent examination recognized by any Indian University or a duly constituted Board with pass marks (50%) in physics, chemistry, biology.
2. He/she has attained the age of 17 years as on - (current year) & maximum age limit is 30 years.
3. For the candidates who have studied abroad, the rules of GITAM (deemed to be University) will be followed.

ABOUT THE COURSE:

B.Sc. Optometry program is a four-year program in the science of eyesight care. This program covers an examination, diagnosis, treatment, and management of illnesses and disorders of the visual system. The program also includes a one-year required internship. With the help of our degree program, students can pursue various optometry positions and develop their independent practices by opening their eye clinics, optical stores, lens production facilities, etc. Several scopes are available on the market nowadays for B.Sc. in Optometry graduates. These graduates can work with ophthalmologists in hospital clinics, practice in optical settings, own optical businesses, and have fantastic employment prospects abroad. Graduates of the B.Sc. in Optometry program may also start optical lens production facilities. Students interested in furthering their education can enroll in M.Sc. and Ph. D. programs in their respective disciplines and pursue a career in teaching.

COURSE ADMINISTRATION

The course is delivered in 8 semesters with each semester dealing with prescribed subjects.

- All subjects are mandatory for the student. The student will be trained in both theory and practical/clinical aspects of the course. Student is assessed by formative and summative assessment every semester.

- There will be one internal exam before the semester-end exam. Candidates should score a minimum of 35% marks theory and practical internal assessment examination separately to be eligible to appear in the University exam in that subject.
- A candidate shall be declared to have passed in the concerned subject, if he fulfills the following criteria
    - He / She secured 35% marks in the internal assessment and
    - (a) He / She secured 40% marks in theory and
      (b) 50% marks in practicals & viva and
      (c) 50% marks in theory, practical &viva put together in each subject separately.

Course objectives and learning outcomes are specified leading to clarity on what a student would be able to do at the end of the program.

STRUCTURE OF THE PROGRAM

The program is a four-year program comprising of eight semesters that is credit and semester based. The courses are categorized into foundational courses and core courses.

- Foundation Course (FC)
- Core course (C)

Each academic year consists of two semesters. The curriculum structure of the B.Sc. Paramedical program and the contents for various courses offered are recommended by the Board of Studies concerned and approved by the Academic Council.

MEDIUM OF INSTRUCTION

The medium of instruction (including examinations and project reports) shall be English. The method of instruction shall comprise classroom lectures, guest lectures, demonstrations, presentations, role-playgroup discussions, seminars, class tests, case analysis, situational analysis, practical training etc.

ATTENDANCE REQUIREMENTS

- A candidate must have not less than 75% attendance in theory and 80% in practicals separately.

ELIGIBILITY TO APPEAR FOR SEMESTER EXAMINATION

- Candidates should score a minimum of 40% marks theory and practical internal assessment examination separately to be eligible to appear in the University exam in that subject.

- There will be one internal exam before the semester- end exam.
- Internal marks will be considered for eligibility for the semester exam but will not be added for the semester exam.

EXAMINATION DURATION AND PATTERN

a. 100 Marks subjects: (Theory: 60 Marks; Practical: 40 Marks)
   - Anatomy & Physiology (Theory: 30+30 Marks; Practical: 20+20 Marks)
   - Biochemistry
   - Microbiology
   - Pathology
   - General Surgery
   - Principles of management (For B.Sc. Medical Lab Technology)
   - Parent Department Subjects

b. 40 Marks Subjects: (Theory: 40 marks)
   - Introduction to Healthcare Delivery System, Research Methodology & Biostatistics
   - Introduction to Quality and patient safety
   - Basic Computers and Information Science
   - English, Communication and soft skills
   - Professionalism & Values
   - Principles of management (For B.Sc. Anesthesiology Technology, Optometry, Radiology and Imaging Technology, Renal Dialysis Technology, Emergency Medical Technology)
   - Medical Law & Ethics
   - Pharmacology
   - General Medicine

c. Pattern of question paper

60 marks paper (Duration: 2 ½ Hours)

1 Q	Essay	(1x 10m = 10 marks)
2 Q to 5 Q	Short notes	(total 4 Q, 4 x 5 m = 20 marks)
6 Q to 15 Q	very short notes	(total 10 Q, 10 x 3m = 30marks)

40 marks paper (Duration: 2 hours)

1 Q	Essay question	(1 x10 m = 10 marks)
2 Q to 4 Q	Short notes	(3 Q x 5 = 15marks)
5 Q to 9 Q	Very short notes	(5 Q x 3 m = 15marks)

PAPER SETTING

Paper setting, paper valuation and practical examination is done by internal examiners from the I to VII semesters.

CRITERIA FOR EXAMINER

Professor or Associate Professor or Assistant Professor are eligible to be as examiners.

GRACE MARKS:

Maximum 5 marks can be awarded to one subject provided he/she passed all the other subjects or these 5 marks can be split for maximum 2 subjects.

PASS CRITERIA

A candidate shall be declared to have passed the examination if he/ she secured…

(a) 40% marks in theory.
(b) 50% marks in practical & viva
(c) 50% marks in theory, practical & viva put together in each subject separately.

EVALUATION:

Single valuation is done for the theory exams and for the practical exams.

REVALUATION:

Revaluation of the theory answer scripts of the end-semester examinations is also permitted on request, on payment of the prescribed fee within seven days from the date of announcement of the results.

REAPPEARANCE FOR BACKLOGS:

A student who has secured 'F' grade shall have to reappear for the examination as per the regulations to improve the grade.

A student who has secured 'F' grade in Project work / Industrial Training etc., has to re-appear for Viva – Voce to improve the grade.

ANSWER SCRIPT VERIFICATION & CHALLENGE VALUATION:

A provision for Answer Book Verification & Challenge Valuation was given on the following conditions.

- The verification is allowed only after announcement of revaluation results in case of UG programs.
- If the student is not satisfied with the marks awarded in revaluation, he/she can apply for Answer Book verification on payment of prescribed fee for each paper (Program) within one week after announcement of Revaluation results.
- If the student is not satisfied with the marks awarded after Answer Script Verification (i.e. Revaluation marks), he/she can apply for Challenge Valuation on payment of prescribed fee for each paper (Program) within two weeks from the date of Answer Book Verification.

ASSESSMENT GUIDELINES

RELATIVE GRADING

S.No.	Grade	Description	Grade Formula	Grades based on percentile for a normal distribution	Grade Point
1.	O	Outstanding	Total Marks≥(μ+ 1.5σ)	93.3	10
2.	A+	Excellent	(μ+ 1.0σ)≤Total Marks<(μ+1.5 σ)	84.1	9
3.	A	Very Good	(μ+0.5 σ)≤ Total Marks<(μ+ 1.0 σ)	69.1	8
4.	B+	Good	(μ-0.5σ) ≤Total Marks<(μ+0.5σ)	30.8	7
5.	B	Above Average	(μ- 1.0 σ) ≤Total Marks<(μ- 0.5σ)	15.8	6
6.	C	Average	(μ- 1.5σ)≤Total Marks<(μ-1.0σ)	6.6	5
7.	P	Pass	40≤Total Marks<(μ- 1.5 σ)	2.2	4
8.	F	Fail	Total Marks <40	0	0
9.	Ab	Absent			NA
10.	S	Satisfactory for Non-graded courses			NA
11.	U	Unsatisfactory for Non-graded courses			NA
12.	R	Insufficient attendance in the course			0
13.	W	Withdrawal from the course			0

In the relative grading system (RG), grades are given based on the other students' scores in the same class. It indicates the academic standing/merit of the student in that class. Here, class means a cohort of students who are taught by the same faculty member and have undergone the same assessment pattern. RG overcomes problems encountered with AG, including inconsistency in the level of the question paper and evaluation etc. This evaluation procedure is adopted for T (Theory), TP (Theory and practical) and certain chosen practical courses. The grades and grade points in the relative grading system are as given below. The class average mark (μ) is taken as the midpoint of 'B+ (Good)' grade, and relative to this and depending on the sigma (σ, standard deviation) value, the other grades are finalized. Grades are assigned based on the percentiles determined for a normal distribution given in the table below.

Computing Grade point averages (SGPA,CGPA)

The procedure adopted for computing the grade point average for the semester and cumulative is as follows:
Semester Grade point average(SGPA)for a semester is calculated as:

$$\text{SGPA} = \frac{\sum_{i=1}^{n} Ci * Gi}{\sum_{i=1}^{n} Ci}$$

where 'n' is the number of courses taken by the student in a semester. 'Ci' represents the number of credits allotted to the course 'i'.
'Gi' represents the grade points secured by the student in course 'i'.

Cumulative Grade Point Average (CGPA):It is calculated as:

$$\text{CGPA} = \frac{\sum_{i=1}^{m} Ci * Gi}{\sum_{i=1}^{m} Ci}$$

where 'm' is the number of courses graded to date.
'Ci' represents the number of credits allotted to the course 'i'.
'Gi' represents the grade points secured by the student in course 'i'.

The SGPA will be awarded to the students for all the registered courses in a semester. The credits of the failed courses shall also be considered while calculating SGPA/CGPA in a given semester. For cases where multiple attempts have been made to get a letter grade, the last successful attempt will be used for the CGPA calculation.

The additional credits earned by a student over and above the minimum required for a said category in a program will not be considered for the calculation of CGPA. However the courses which contribute towards higher CGPA will be considered for inclusion.

Calculation of CGPA

The CGPA shall be calculated taking into consideration the grades of courses obtained by the candidates in GITAM. In the case of Study Abroad, Twinning, Joint or Dual Degree Programs, the CGPA will be calculated according to the respective policy applicable and prevailing at the time of joining the program.

Incomplete (I) Grade

'I' grade is assigned if the student has any pending assessment components in Internship, Project and research. The student can initiate the request through the Mentor, and an 'I' grade will be posted after receiving the recommendation from the HoD.

Repeat (R) grade

'R' grade is assigned if the student has to repeat the course due to a shortage of attendance. The student has to re-register for the course in the subsequent semesters when the course is next offered by paying

the prescribed fees.

Withdrawal (W) grade

'W' grade is assigned if the student has withdrawn from the course within twenty (20) working days of the semester.

Award of class

The cumulative grade point requirement for the award of the class is as follows:

Class	CGPA required
First-class with distinction	7.5 and above
First-class	6.00 - 7.49
Second class	≥ 5.5
Pass class	≥ 5.0

*In addition to the required CGPA of 8.0 or more, the student must have necessarily passed all the registered courses in the first attempt. Distinction will not be awarded if the student fails in ANY subject.

Transcript Format

Based on the above recommendation on letter grades, grade points, SPGA and CGPA, the transcript shall be issued for each semester with a consolidated transcript indicating the performance in all semesters.

VISION:

To become a leader of excellence in healthcare and health professions' education pioneering in experiential learning, redefining compassion, service and self-reliance to produce and nurture the next generation of visionary healthcare professionals

MISSION:

1. Develop a need-oriented learning ecosystem promoting critical thinking and holistic development
2. Offer evidence-based healthcare training at par with global standards
3. Encourage autonomy and innovation for healthcare delivery to achieve atma-nirbhar
4. Inculcate a philosophy of empathetic healthcare service within GITAM, fostering passionate health professionals

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

PEO 1	To impart knowledge and skill in accordance with the requirement in basic medical sciences and paramedical specialty as relevant
PEO 2	To impart training required to carry out necessary investigative procedures accurately to facilitate proper diagnosis and prognosis of diseases
PEO 3	To train the student to perform routine as well as special investigative procedures in the concerned paramedical specialty
PEO 4	To impart knowledge and practical training required to operate and maintain all equipment used in the concerned specialization
PEO 5	To impart knowledge about communication skills, basic research skills, professionalism, and ethical aspects required in various health care settings for effective delivery of health care

PROGRAM OUTCOMES (POs)

PO1	To prepare a cadre of healthcare technologists who can effectively assist senior health professionals in the delivery of quality health services.
PO2	To prepare skilled paramedical human resources for all levels of the healthcare delivery system from primary to tertiary care level.
PO3	To train the students to carry out necessary procedures accurately and to facilitate proper diagnosis and prognosis of diseases.
PO4	To enable to perform routine as well as special investigative procedures in the concerned paramedical specialty.
PO5	To develop knowledge and skill in accordance with the demand in the field of paramedical specialty as applicable.
PO6	To enable to operate and maintain all types of equipment used in the concerned specialization.
PO7	To make capable to support advanced testing activities and Research.
PO8	To enable to work as Supervisor/Trainer/Teacher in the field of Paramedical sciences.
PO9	To enable to communicate and interact effectively with non-clinical and clinical persons in various healthcare environments
PO10	To be able to present oneself in an ethical and professional manner
PO11	To equip the paramedical staff with modern skills and knowledge to bring them at par with other national and international standards
PO12	Students who complete these programs will be able to work in both an individual and team environment

PROGRAM SPECIFIC OUTCOMES (PSOs)

At the end of course the student will be able to:

PSO1	To know about basic organ systems, with special emphasis on the ocular and visual system, and their inter-relationships to the body as a whole.
PSO2	Understand the structures and processes contributing to the development of refractive error and other optical and perceptual abnormalities of the visual system.

PSO3	To know about Mechanisms of action of the various classes of pharmaceutical agents, their interactions and their safe and effective use for the treatment of diseases and conditions affecting the eye and visual system
PSO4	The optics of the eye and ophthalmic lens systems (including spectacles, contact lenses and low vision devices) used to correct refractive errors.
PSO5	To understand about Vision therapy, Low vision aids and other rehabilitative methods used for the management of common visual disorder
PSO6	To practice independently as a primary eye care practitioner and work in eye care services where ever ophthalmologist services not available for the benefit of society.
PSO7	To develop such professionals who will actively participate in community optometry such as national programs for the prevention of blindness and effectively organize and participate in vision screening eye camps to help controlling blindness
PSO8	To be able to become an entrepreneur as an optometrist.

SUBJECTS FOR SEMESTER EXAMS WITH HOURS AND CREDITS

Semester-I									
SI. No.	**Subject Code**	**Subject**	**Hours**			**Credits**			**Course Type**
			Theory	Practical	Total	Theory	Practical	Total	
1	24CMED1001	Introduction to Healthcare Delivery System, Research Methodology & Biostatistics	15	-	15	1	-	1	FC
2	24PSGY1001	Anatomy-I (Part-A)	30	15	45	2	0.5	2.5	C
		Physiology-I (Part-B)	45	15	60	3	0.5	3.5	C
3	24MIBG1001	Introduction to Quality and patient safety	60	60	120	4	2	6	FC
4	24CSEN1071	Basic Computers and Information Science	15	30	45	1	1	2	FC
5	LANG1281	English, Communication and soft skills	30	-	30	2	-	2	FC
6	24CMED1011	Professionalism & Values	15	-	15	1	-	1	FC
7	ODHR1001	Principles of Management	15	-	15	1	-	1	FC
		Total	**225**	**120**	**345**	**15**	**10.5**	**19**	C

Semester-II									
SI. No.	**Subject Code**	**Subject**	**Hours**			**Credits**			**Course Type**
			Theory	Practical	Total	Theory	Practical	Total	
1	24OPTH1001	Ocular Anatomy	30	15	45	2	0.5	2.5	C
2	24OPTH1011	Ocular Physiology	30	15	45	2	0.5	2.5	C
3	24BCHE1021	Biochemistry	30	15	45	2	0.5	2.5	C
4	24FMED1001	Medical Law and Ethics	15	0	15	1	0	1	FC
5	24OPTH2001	Physical Optics	15		15	1	0	1	C
6	24OPTH2011	Geometrical Optics	15	0	15	1		1	C
7	24OPTH2021	Clinical Optometry-I		360	360		12	12	C
		Total	**135**	**405**	**540**	**9**	**13.5**	**22.5**	

Semester-III									
SI. No.	**Subject Code**	**Subject**	**Hours**			**Credits**			**Course Type**
			Theory	Practical	Total	Theory	Practical	Total	
1	24NURS1001	Basics of Patient Care	30	0	30	2	0	2	FC
2	24MIBG1031	Microbiology	60	15	75	4	0.5	4.5	C
3	24PATH1031	Pathology	60	15	75	4	0.5	4.5	C
4	24OPTH2031	Visual optics –I	15		15	1		1	C
5	24OPTH2041	Optometric optics-I	30		30	2		2	C
6	24OPTH2051	Optometric Instruments	30	15	45	2	0.5	2.5	C
7	24OPTH2061	Ocular Disease –I	30		30	2		2	C
8	24OPTH2071	Clinical examination of visual system	15	15	30	1	0.5	1.5	C
9	24OPTH2081	Clinical Optometry-II		210	210		7	7	C

Total	**240**	**270**	**540**	**17**	**9**	**26**	

Semester-IV									
SI. No.	**Subject Code**	**Subject**	**Hours**			**Credits**			**Course Type**
			Theory	Practical	Total	Theory	Practical	Total	
1	24OPTH3001	Optometric optics – II & Dispensing Optics	30	0	30	2		2	C
2	24OPTH3011	Visual Optics- II	30	0	30	2		2	C
3	24OPTH3021	Ocular Disease –II and glaucoma	30	0	30	2		2	C
4	24OPTH1021	Basic and Ocular Pharmacology	30	0	30	2	0	2	C
5	24OPTH3031	Clinical Optometry-III		420	420		14	14	C
Total			**120**	**420**	**540**	**8**	**14**	**22**	

Semester -V									
SI. No.	**Subject Code**	**Subject**	**Hours**			**Credits**			**Course Type**
			Theory	Practical	Total	Theory	Practical	Total	
1	24OPTH3041	Contact lens –I	15	15	30	1	0.5	1.5	C
2	24OPTH3051	Low Vision care	15	15	30	1	0.5	1.5	C
3	24OPTH3061	Geriatric Optometry & Pediatric Optometry	30		30	2		2	C
4	24OPTH3071	Binocular Vision-I	15		15	1		1	C
5	24OPTH3081	Systemic Disease	15		15	1		1	C
6	24OPTH3091	Clinical Optometry IV		420	420		14	14	C
Total			**90**	**450**	**540**	**6**	**15**	**21**	

Semester-VI									
SI. No.	**Subject Code**	**Subject**	**Hours**			**Credits**			**Course Type**
			Theory	Practical	Total	Theory	Practical	Total	
1	24OPTH3101	Contact Lens –II	30	30	60	2	1	3	C
2	24OPTH3111	Binocular Vision –II	30	15	45	2	0.5	2.5	C
3	24OPTH3121	Public Health & Community Optometry	15		15	1		1	C
5	24OPTH3131	Occupational optometry	15		15	1		1	C
6	24OPTH3141	Research Project - I		30	30		1	1	C
7	24OPTH3151	Clinical Optometry V		375	375		12.5	12.5	C
Total			**90**	**450**	**540**	**6**	**15**	**21**	

Semester - VII & VIII

Sl. No.	Subject Code	Subject	Hours			Credits			Course Type
			Theory	Practical	Total	Theory	Practical	Total	
1		Internship		1440					C
Total				**1440**					

SEMESTER - I

INTRODUCTION TO HEALTHCARE DELIVERY SYSTEM, RESEARCH METHODOLOGY & BIOSTATISTICS

INTRODUCTION:

The art and science of application of technical knowledge and skills to the delivery of health care to given community, designed in collaboration with related professionals as well as human and social science on one hand and the community on the other hand. Preventive medicine is science and art of preventing disease, prolonging life and promoting physical and mental health and efficacy.

COURSE OBJECTIVES:

- To orient the students with national health programs
- To learn categories and coding of hospital waste and their disposal methods.
- To know various occupational health hazards and prevention and control of them.
- To make the students aware of tabulation of data, measuring mean and SD

SYLLABUS
Hours: Theory 15
Credits: Theory 01

NO. OF UNITS	CONTENT	NO. OF HOURS
I	**Introduction to healthcare delivery system** a) Healthcare delivery system in India at primary, secondary and tertiary care, Principles and Elements of Primary Health Care b) National Health Mission c) National Health Policy 2017	**3**
II	**National Health Program:** Background objectives, action plan, targets, operations, achievements and constraints in various National Health Programs. **Introduction to AYUSH system of medicine and Need for integration of various systems of medicine**	**3**
III	**Demography & Vital Statistics:** a) Demography – its concept b) Vital events of life & its impact on demography c) Significance and recording of vital statistics d) Census & its impact on health policy	**5**

	Epidemiology: a. Principles of Epidemiology b. Natural History of disease c. Methods of Epidemiological Studies **d.** Infectious disease epidemiology - dynamics of disease transmission, host defence immunizing agents, cold chain, immunization, disease monitoring and surveillance.	
VI	**Research Methodology:** 1. Introduction to research methods 2. Identifying research problem 3. Ethical issues in research 4. Research design 5. Basic Concepts of Biostatistics 6. Types of Data 7. Research tools and Data collection methods 8. Sampling methods 9. Developing a research proposal	**3**
V	**Biostatistics** The objective of this is to help the students understand the basic principles of research and methods applied to draw inferences from the research findings.	**1**

COURSE OUTCOMES:

This course is aimed to make the student to understand national health programs, hospital waste management, occupational health hazards prevention and control of occupational diseases and calculation of measures of central tendency and diagrammatic representation of data.

REFERENCES:

- Park's Textbook of Preventive and Social Medicine – 26th edition
- Statistics and Research: Mahajan

ANATOMY - I

INTRODUCTION:

Anatomy deals with the structural organization of the human body. Anatomy forms the basis for the practice of medicine. Students need core knowledge of human anatomy as they venture into the clinical domain. The department of anatomy is committed to providing quality education for students by its fully-equipped facilities. Cadaveric dissections & specimens, histology slides, and VARIOUS models provide the idealenvironment to learn anatomy during the 1st year of their course.

COURSE OBJECTIVES:

- The objective of this subject is to provide an outline of anatomy to improve the students understanding of the technical and diagnostic procedures used, withspecial emphasis on applied aspects.

SYLLABUS

Hours: Theory 30 & Credits 2

Practical 15 Credits 0.5

Theory:

UNIT	CONTENT	No. OF HOURS
I	**Introduction to anatomical terms and organization of the human body** 1.Undertanding the anatomical terms relative to position–anterior, ventral, posterior dorsal, superior, inferior, median, lateral, proximal, distal, superficial, deep, prone, supine, palmar and plantar Anatomical planes (axial/ transverse/horizontal, sagittal/vertical plane and coronal/frontal/oblique plane) 2.Describe the Movements (flexion, extension, abduction, adduction, medial rotation, lateral rotation, inversion, eversion, supination, pronation, plantar flexion, dorsal flexion and circumduction 3. Describe the Cell structure, Cell division, 4.Define the Tissue and classify various types, characteristics, classification, location 5. Describe the location of Hyaline cartilage ,fibrocartilage, elastic cartilage, 6.Describe the Histology of Bone, 7. Describe the Features of skeletal, smooth and cardiac muscle.	5
II	The Respiratory system	5

	1. Describe the Structure of the organs of respiration. 2. Describe the morphology of Pleura, 3. Describe the Morphology of Lungs, Bronchopulmonary Segments. 4. Histology of Lungs	
III	Cardiovascular system 1. Describe the Morphology of Heart, Internal features of Heart – right atrium and right ventricle Chambers & Openings of the heart, 2. 2.Classify Types of Circulation and understand Coronary Circulation in detail 3. Describe Aorta its parts and its branches.	8
IV	Muscular system types of muscles 1. Describe Muscles of Upper Limb including Arm and Fore Arm, 2. Describe Muscles of back, diaphragm, Muscles of arm, Muscles of Forearm 3. Understand the Significance of Deltoid Muscle, 4. Describe the Muscles of Lower Limb, Muscles of thigh, Muscles of Leg 5. Understand the significance of Gluteus Maximus Muscle.	5
V	1. Describe the Blood vessels of Upper Limb : Arm- Axillary artery, brachialartery 2. Describe arteries of fore Arm - Radial artery, ulnar Artery, medial cubital vein, 3. Describe the Blood vessels of Lower Limb : Thigh femoral artery, popliteal artery	7

Practical:

NO. OF UNITS	CONTENT	NO. OF HOURS
I	Microscopy, Histology of tissues – cartilage, Bone and Lung	2
II	Intercostal space, Heart, Lungs	3
III	Upper Limb – Bones, Muscles, Axillary artery, brachial artery, fore Arm - Radial artery, ulnar Artery, medial cubital vein, Nerves : Axillaries Nerve , Median Nerve, Ulnar Nerve, radial Nerve	4
IV	Lower Limb – Bones, Muscles, Thigh femoral artery, popliteal artery Nerves of Lower Limb: Femoral Nerve, Sciatic Nerve, Obturator Nerve	4

V	Normal X- Rays, Surface markings	2

COURSE OUTCOMES:

- Explains knowledge on the basic anatomy of various regions like limbs, thoracic and abdominal viscera, osteology, neuroanatomy, endocrine system, basic radiology which provides a foundation in completion of the course.
- Explain the anatomy and functions of various Tissues and cells, an organization of a cellular system.
- Understand the functioning of lungs, heart, and blood vessels.

REFERENCES:

1. BD Chaurasia : Handbook of general anatomy
2. Textbook of Anatomy & Physiology by InduKhurana & Arushi
3. Textbook of Anatomy & Physiology by PR Ashalatha & G Deepa
4. Textbook of Anatomy & Physiology by Ashalatha N Nandedkar, Vijay D Joshi& Sadhana – 3rd edition

PHYSIOLOGY - I

INTRODUCTION

Physiology is the study of functions and mechanisms in a living system. Physiology focuses on individual organs, cells, and bio molecules carrying out the chemical and physical functions in a living system. The physiological state is the condition of normal function, while the pathological state refers to abnormal conditions, including human diseases.

COURSE OBJECTIVE

- Understand the basic physiological functions of different organs and parts of the human body and important applied aspects.

SYLLABUS

Credits: Theory 03 & Practical 0.5

Hours: Theory 45 & Practical 15

NO. OF UNITS	CONTENT	NO. OF HOURS
I	**Cell Physiology** 1. Describe the structure and functions of cell 2. Describe the functions of the cell organelles 3. Describe briefly the types of transport across cell membrane and carrier systems.	05
II	**Blood Physiology and Immunology** 1. Describe the normal composition of human blood and its functions 2. Describe the normal plasma proteins & their functions 3. Describe the structure and functions of RBC and hemoglobin 4. Describe the process of Erythropoiesis 5. Describe the Structure, production, & functions of WBCs 6. Describe the structure, production & functions of Platelets 7. Describe the Types of blood groups and their importance, 8. Describe the Mechanism of coagulation 9. Define immunity and describe the types of immunity 10. Classify antigen & antibodies 11. Describe T cell immunity & B cell immunity	12
III	**Muscle & Nerve Physiology; ANS** 1. Describe the physiological structure of muscle tissue and its types 2. Describe the parts of neuron and their functions, and the synapse and	08

	its function 3. Describe the action potential, its basis, refractory period, latent period, etc. and neuromuscular transmission 4. Describe briefly the autonomic nervous system and the functions and effects of the sympathetic and parasympathetic nervous systems	
IV	**Digestive System** 1. Describe briefly the Physiological anatomy of G.I.T and its functions. 2. Describe briefly the composition and functions of Saliva 3. Describe briefly the physiological anatomy of the stomach and the composition, functions of gastric juice. 4. Describe briefly the functions of pancreas, and the composition & functions of pancreatic juice. 5. Describe briefly the functions of liver and gall bladder and the Composition, and functions of bile juice**.**	08
V	**Respiratory System** 1. Describe the physiological structure and functions of Respiratory tract. 2. Describe the Mechanics of respiration and its regulation 3. Describe the Fundamentals of oxygen and CO2 transport in blood 4. Describe the lung volumes, spirometry & their importance	12
PRACTICAL		
NO. OF UNITS	**CONTENT**	**NO. OF HOURS**
I	Estimate Hemoglobin in given blood sample, Estimate bleeding time & clotting time	04
II	Perform RBC count of given blood sample	02
III	Perform WBC count of given blood sample Perform a differential WBC count of the given sample	04
IV	Calculation of blood indices, Determination of Blood Groups	03
V	Amphibian Nerve muscle charts	02

COURSE OUTCOMES:

- Explain the anatomy, physiology and functions of various Tissues and cell, organization of cellular system.
- Explain Hematopoietic and lymphatic system homeostatic and its altered physiology.

- Explain the anatomy and Physiology of the cardiovascular and respiratory system and its disorders.
- Explain the anatomy and Physiology of digestive, urinary, and reproductive systems and their disorders.
- Describe the Physiology of muscle contraction and its disorders.

REFERENCES:

- Textbook of physiology for BDS AK Jain 6th edition
- Textbook of physiology for BDS Sembulingam 3rd edition
- Physiology in nutshell by AK Jain 5th edition

INTRODUCTION TO QUALITY AND PATIENT SAFETY
SYLLABUS
Theory: 60 hrs Credits 4
Practical/Clinical: 60hrs Credits 2

Rationale: The subject will introduce the students to the basic concepts of quality in health care and develop skills to implement sustainable quality assurance program in the health system. It will sensitize them in basic emergency care, infection prevention & control with knowledge of bio medical waste management and antibiotic resistance.

NO. OF UNITS	CONTENT	NO. OF HOURS
I	**Quality assurance and management** 1. Concepts of Quality of Care 2. Quality Improvement Approaches 3. Standards and Norms 4. Quality Improvement Tools 5. Introduction to NABH guidelines	10
II	**Basics of emergency care and life support skills** 1. Vital signs and primary assessment 2. Basic emergency care – first aid and triage 3. Ventilations including use of bag-valve-masks (BVMs) 4. Choking, rescue breathing methods 5. One- and Two-rescuer CPR 6. Using an AED (Automated external defibrillator). 7. Managing an emergency including moving a patient	10
III	**Bio medical waste management and environment safety** 1. Definition of Biomedical Waste 2. Waste minimization 3. BMW – Segregation, collection, transportation, treatment and disposal (including color coding) 4. Liquid BMW, Radioactive waste, Metals / Chemicals / Drug waste 5. BMW Management & methods of disinfection 6. Modern Technology for handling BMW 7. Use of Personal protective equipment (PPE) 8. Monitoring & controlling of cross infection (Protective devices	8
	Infection prevention and control 1. Evidence-based infection control principles and practices [such as Sterilization, Disinfection, Effective hand hygiene and use of Personal Protective Equipment (PPE)].	12

	2. Prevention & control of common healthcare associated infections 3. Components of an effective infection control program, and 4. Guidelines (NABH and JCI) for Hospital Infection Control	
IV	**Antibiotic Resistance** 1. History of antibiotics 2. How resistance happens and spreads 3. Types of resistance- intrinsic, acquired, passive 4. Trends in drug resistance 5. Actions to fight resistance 6. Bacterial persistence 7. Antibiotic sensitivity 8. Consequences of antibiotic resistance 9. Antimicrobial Stewardship – Barriers and opportunities, tools and models in hospitals	10
V	**Disaster preparedness and management** 1. Fundamentals of emergency management 2. Psychological impact management 3. Resource management 4. Preparedness and risk reduction 5. Key response functions (including public health, logistics and governance, recovery, rehabilitation and reconstruction), information management, incident command and institutional mechanisms.	10

SUGGESTED READINGS:

1. The Essentials of Patient Safety by Charles Vincent
2. Laboratory quality control and patient safety by De Gruyter
3. Essentials of applied microbiology for nurses including infection control and safety by Apurba

PRACTICAL/ CLINICAL

No. OF UNITS	CONTENT	No. OF HOURS
I	**QUALITY AND PATIENT SAFETY** a) Discussion on Concepts of Quality of Care b) Approaches to Quality Improvement c) Quality Improvement Tools	10

	Discussion on NABH guidelines and its exercises	
II	**BASICS OF EMERGENCY CARE AND LIFE SUPPORT SKILLS** 1. Vital signs and primary assessment 2. Basic emergency care – first aid and triage 3. Ventilations including use of bag-valve-masks (BVMs) 4. Choking, rescue breathing methods 5. One- and Two-rescuer CPR 6. Using an AED (Automated external defibrillator). Managing an emergency including moving a patient Students should perform the maneuvers in simulation lab and to test their skills with focus on airways management and chest compressions.	10
III	**BIO MEDICAL WASTE MANAGEMENT AND ENVIRONMENT SAFETY** 1. Visit to Central Sterile Supply Department (CSSD) 2. Visit to incinerator complex 3. Visit to Immunization section 4. Discussion on Biomedical Waste, 5. Demonstration of Types of waste generated from Health Care Facility 6. Discussion on waste minimization 7. Poster presentation of BMW – Segregation, collection, transportation, treatment and disposal (including color coding) 8. Discussion on Liquid BMW, Radioactive waste, Metals / Chemicals / Drug waste 9. Visit to Central Sterile Supply Department for demonstration of BMW Management & methods of disinfection 10. Modern Technology for handling BMW e.g. Incinerator, Shredder etc. 11. Demonstration of proper use of Personal protective equipment (PPE) 12. Demonstration of monitoring & controlling of cross infection (Protective devices)	8
	INFECTION PREVENTION AND CONTROL 1. Demonstration of evidence-based infection control principles and practices [such as Sterilization, Disinfection, Effective hand hygiene	12

	and use of Personal Protective Equipment (PPE)], 2. Discussion on prevention & control of common healthcare associated infections, 3. Preparing Charts & Posters of Components of an effective infection control program, and 4. Guidelines (NABH and JCI) for Hospital Infection Control	
IV	**ANTIBIOTIC RESISTANCE** 1. Discussion on various types of Antibiotics 2. Demonstration of how Resistance Happens and Spreads 3. Discussion on types of resistance- Intrinsic, Acquired, Passive 4. Antibiotic sensitivity testing 5. Display of Consequences of antibiotic resistance 6. Demonstration of Antimicrobial Barriers and opportunities, Tools and models in hospitals	10
V	**DISASTER PREPAREDNESS AND MANAGEMENT** 1. Discussion on fundamentals of emergency management, 2. Management psychological impact 3. Discussion on; 3.1 Resource management, 3.2 Preparedness and risk reduction	10

BASICCOMPUTERS AND INFORMATION SCIENCE

INTRODUCTION:

Computer science spans theoretical disciplines (such as algorithms, theory of computation, and information theory) to practical disciplines (including the design and implementation of hardware and software). It deals with concepts regarding the architecture of a computer, common application software and uses of computers in everyday life.

COURSE OBJECTIVES:

To build necessary concepts regarding the architecture of a computer

To develop an understanding of the common application software.

To understand the uses of computers in everyday life.

SYLLABUS

Theory Credits: 1,Hours:15

Practical Credits: 1, Hours:30

NO. OF UNITS	CONTENT	Theory NO. OF HOURS	Practical NO. OF Hours
I	1. Describe and identify the principal components of a computer 2. Define the various terms used in computer – hardware/software / operating system 3. Describe the functions and uses of computers including in health care	2	4
II	1. Mention the common types of files including Word documents, Spreadsheets (Excel) and Presentations (PowerPoint) and their uses 2. Basic Network connecting 3. Explain the uses of the internet and email 4. Collaborative work using Google suite of applications / Microsoft Office 365	3	6
III	1. Demonstrate use of a computer for common purposes 2. Demonstrate methods for Data storage & retrieval and making folders; 3. Perform functions like date/time setting or changing, change display settings, Installing /removing programs etc. 4. Understand and Use MS Word / Word Document program 5. Prepare a properly formatted, spell-checked document in Word Document including insertion of images and tables and take a print-out/mail as an attachment, and convert to PDF (portable document format) 6. Understand and Use MS Excel / Data spreadsheet 7. Prepare a proper Excel document (spreadsheet) with given data and sort out data, insert / delete cells, etc., use formula bar for common functions like calculate mean etc, convert to pictorial	5	10

	format like bar / pie diagram, etc. 8. Prepare and use computer-based presentations like PowerPoint with appropriate fonts and colors including insertion of images, videos etc.		
IV	1. Prepare an appropriate file like excel to enter patient data and retrieve it 2. Use the facility of Mail Merge between Excel to a Word document 3. Sending customized email to selected members. 4. Prepare a patient report and take a print out	3	6
V	1. Prepare a database of patient info and lab results for storage and later retrieval 2. Communicate by e-mail including opening email account 3. Demonstrate use of search engines / Google search etc. for academic information	2	4

LEARNING OUTCOMES:

- At the end of the training program, the student would be able to
- Classify various components of the computer.
- Experiment with the various application software of Microsoft Office suite.
- Make use of collaborative applications over the internet

COURSE OUTCOMES:

At the end of the course student is expected to

1. Know about the concept and architecture of a computer

2. To understand the common application software.

3. To understand and apply the uses of computers in everyday life.

REFERENCES

1. Introduction to Computers by Peter Norton (McGraw Hill Education)
2. Mastering Excel: A Problem-Solving Approach by James Gips (John Wiley and Sons)
3. SAMs Teach Yourself Computer Basics in 24 hours

ENGLISH, COMMUNICATION & SOFT SKILLS

INTRODUCTION:

The course is a unified approach to enhance language skills of learners with an aim to honetheir social skills and to increase their employability. The course is designed to acquaint the learners with the necessary LSRW (Listening/ Speaking / Reading/ Writing) skills It enables the learners improve their communication skills which are crucial in an academic environment as well as professional and personal lives.

COURSE OBJECTIVES

- This course trains the students in oral presentations, expository writing, logical organization and structural support.
- By acquiring skills in the use of communication techniques the students will be able to express better, grow personally and professionally, develop poise and confidence and achieve success.

SYLLABUS
Hours : 30 Credits: 02

NO. OF UNITS	CONTENT	NO. OF HOURS
I	**BASICS OF ENGLISH GRAMMAR** Vocabulary:- Synonyms , Antonyms, Prefix and suffix , Homonyms , Tenses , subject verb agreement , common errors in English.	8
II	**LISTENING AND SPEAKING SKILLS** Importance of listening and speaking. Barriers in listening and speaking. Good and persuasive listening and speaking Note Taking, Watching Video Clips and Listening to Audio Clips, Listening to and Watching News and Panel Discussions JAM (Just-A-Minute),Oral Presentation , Group Discussion	8
III	**READING AND WRITING SKILLS** Efficient and fast reading, Importance of Skimming and Scanning	4
IV	Letter Writing, Email, Essay, Paragraph writing, Articles, Memos, note making and Comprehension.	4
V	Common Medical Terminology and writing a medical report	6

COURSE OUTCOMES

- By the end of the course, the learners will be able to:
- Think critically, analytically, creatively and communicate confidently in English insocial and professional contexts with improved skills of fluency and accuracy.
- Write grammatically correct sentences employing appropriate vocabulary suitableto different contexts

- Comprehend and analyze different academic texts.
- Make notes effectively and handle academic writing tasks such as Paragraph writing and Essay writing.
- Effectively handle formal correspondence like e-mail drafting and letter writing.

REFERENCE BOOKS:

- Arosteguy, K.O. and Bright, A. and Rinard, B.J. and Poe, M. A Student's Guide toAcademic and Professional Writing in Education, UK, Teachers College Press, 2019
- Raymond Murphy, English Grammar in Use A Self-Study Reference and Practice Book for Intermediate Learners of English: Cambridge University Press;2019
- Peter Watkins, Teaching and Developing Reading Skills: UK, CUP, 2018
- Deeptha Achar et al. Basic of Academic Writing. (1and 2) parts New Delhi: OrientBlack Swan. (2012& 2013).
- Kumar S and Lata P, Communication Skills: New Delhi Oxford University Press, 2015

PROFESSIONALISM & VALUES
SYLLABUS
Hours : 15 Credits: 01

NO. OF UNITS	TOPIC	NO. OF HOURS
I	**Professional values** Integrity, Objectivity, Professional competence and due care, Confidentiality	3
II	**Personal values** E ethical or moral values	3
III	**Attitude and behavior** Professional behavior, treating people equally	2
IV	**Code of conduct** Professional accountability and responsibility, misconduct	2
V	Differences between professions and importance of team efforts	2
	Cultural issues in the healthcare environment	3

PRINCIPLES OF MANAGEMENT
SYLLABUS
Hours : 15 & Credits: 01

The course is intended to provide a knowledge about the basic principles of Management.

Unit	Topics	No. of Hours
I	Introduction to management Strategic Management	3
II	Foundations of Planning Planning Tools and Techniques	3
III	Decision Making, conflict and stress management Managing Change and Innovation	3
IV	Understanding Groups and Teams Leadership	3
V	Time Management Cost and efficiency	3

SEMESTER - II
OCULAR ANATOMY

INSTRUCTOR IN CHARGE: Anatomist, Optometrist or Ophthalmologist who have adequate experience in teaching anatomy.

COURSE DESCRIPTION: This course deals with detailed anatomy of the orbit, eyeball and cranial nerves associated with ocular functions.

OBJECTIVES: 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.

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

PREREQUISITES: General Anatomy.

SYLLABUS
Theory: 30 hours/Practical : 15 hours
Credit hrs. Theory 2/ Practical - 0.5

NO. OF UNITS	Topics	No. of Hours
I	Orbit Eye Sclera	6
II	Cornea Choroid Ciliary body Iris	6
III	Retina Refractory media- Aqueous humor	6
IV	Anterior chamber Posterior chamber Lens	6
V	Vitreous body Eyelids Conjunctiva Embryology	6

PRACTICAL TOPICS	NO. OF HOURS
1. Eye: Practical dissection of bull's eye 2. Orbit: Practical demonstration of orbital structures.	**15**

OCULAR PHYSIOLOGY

INSTRUCTOR IN CHARGE: Physiologist, Optometrist or Ophthalmologist with experience in teaching ocular physiology.

COURSE DESCRIPTION: Ocular physiology deals with the physiological functions of each part of the eye.

OBJECTIVES: 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

TEXT BOOK: 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

PREREQUISITES: General Physiology

SYLLABUS
Theory: 30 hours Practical :15 hours
Credits : Theory 2 Practical :0.5

NO. OF UNITS	TOPICS	NO. OF HOURS
I	1. Protective mechanisms in the eye: Eye lids and lacrimation, description of the globe 2. Extrinsic eye muscles, their actions and control of their movements 3. Coats of the eye ball 4. Cornea 5. Aqueous humor and vitreous: Intra ocular pressure	6
II	1. Iris and pupil 2. Crystalline lens and accommodation – presbyopia 3. Retina – structure and functions 4. Vision – general aspects of sensation Pigments of the eye and photo chemistry	6
III	1. The visual stimulus, refractive errors 2. Visual acuity, Vernier acuity and principle of measurement 3. Visual perception – Binocular vision, stereoscopic vision, optical illusions 4. Visual pathway, central and cerebral connections	6
IV	1. Colour vision and colour defects. Theories and diagnostic tests 2. Introduction to electro physiology 3. Scotopic and Photopic vision	6

	4. Color vision, Color mixing Mechanism of accommodation	
V	1. Retinal sensitivity and Visibility 2. Ocular, movements and saccades 3. Visual perception and adaptation	6

PRACTICAL TOPICS	NO. OF HOURS
1. Lid movements	**15**
2. Tests for lacrimation tests	
3. Extra ocular movements	
4. Break up time	
5. Pupillary reflexes	
6. Applanation tonometry	
7. Schiotz tonometry.	
8. Measurement of accommodation and convergence	
9. Visual acuity measurement.	
10. Direct ophthalmoscopy	
11. Indirect ophthalmoscopy	
12. Retinoscopy	
13. Light and dark adaptation.	
14. Binocular vision(Stereopsis)	

BIOCHEMISTRY

INTRODUCTION:

Biochemistry deals with the structures, bonding, functions, and interactions of biological macromolecules, such as proteins, nucleic acids, carbohydrates, and lipids. They provide the structure of cells and perform many of the functions associated with life. Biochemistry focuses on understanding the chemical basis which allows biological molecules to give rise to the processes that occur within living cells and between cells, in turn relating greatly to the understanding of tissues and organs, as well as organism structure and function.

COURSE OBJECTIVES:

Students must understand the basic principles of Biochemistry and the biochemical processes that take place in the human body and their applied aspects.

SYLLABUS

Credits: Theory 02 & Practical 0.5

Hours: Theory 30 & Practical 15

NO. OF UNITS	CONTENT	No. OF HOURS
I	**Enzymes** i. Define and classify with examples, active site, cofactor, proenzyme ii. List the factors affecting enzyme activity Define isoenzymes, enzymology (clinical significance of enzymes)	3
II	**Carbohydrate Chemistry & Metabolism** i. Define carbohydrates, classify carbohydrates with examples, explain glycosidic bond ii. Illustrate composition, sources, and functions of monosaccharides, disaccharides, oligosaccharides, and polysaccharides. iii. Illustrate glycolysis-aerobic, anaerobic, citric acid cycle, substrate phosphorylation iv. Elaborate glycogen metabolism -glycogenesis, glycogenolysis, metabolic disorders of glycogen, gluconeogenesis, Cori cycle v. Summarize hormonal regulation of glucose, glycosuria, diabetes mellitus	**4**
III	**Lipid Chemistry & Metabolism** i. Define and classify lipids ii. Functions of Fatty acids, Triacylglycerol, Phospholipids, cholesterol iii. Essential fatty acids and their importance iv. Explain Lipoproteins: definition, classification, function, ketone bodies v. Fat metabolism in adipose tissues vi. Elaborate ketone body metabolism: formation(ketogenesis), utilization (ketolysis), ketosis, Rothera's test vii. Summarize cholesterol metabolism: synthesis, degradation, cholesterol transport viii. Define Hypercholesterolemia, list its effects, causing agents common hyperlipoproteinemia, Lipoproteins ix. Explain about fatty liver	4
	a) Amino -acid Chemistry & Amino acid and protein metabolism	3

IV	i. Define and classify amino acids ii. Define peptides and explain peptide bonds, list the biologically important peptides. iii. Define and classify proteins, enumerate functions of proteins. iv. Define Catabolism of amino acids- transamination, deamination v. Illustrate fate of ammonia, transport of ammonia, Urea cycle vi. Outline the specialized products formed from amino acids **b) Hormones** Hormones basic concepts in metabolic regulation with examples (Insulin)	2
V	**a) Vitamins** i. Define vitamins and classify them according to solubility ii. List the sources, Coenzyme forms, functions, Recommended Dietary Allowance (RDA) iii. Tell about digestion, absorption and transport, deficiency and toxicity of individual vitamins **b) Mineral metabolism** i. Define minerals and list the sources for mineral and their Recommended Dietary Allowance ii. Tell about digestion, absorption, transport, excretion of various minerals List the functions and disorders of individual minerals – Calcium, phosphate, iron, magnesium, manganese, fluoride, selenium, zinc, molybdenum, copper	4 4
VI	**a) Acid-base balance** i. Define acid, base and pH ii. Handerson Hassel Balch equation, indicators iii. Define buffers and describe buffer systems of the body (bicarbonate buffer system) iv. Elaborate about the role of lungs and kidneys in acid-base balance. v. Acid base disorders **b) FUNCTION TESTS** i. Describe the biochemical functions of kidney and the principal Renal Function Tests ii. Describe the biochemical functions of liver and the principal Liver Function Tests	4 2

NO. OF UNITS	PRACTICAL TOPICS – DEMONSTRATIONS	No. OF HOURS
I	a. Lab safety b. Lab apparatus: Glassware, centrifuge, colorimeter, spectrometry, Electrophoresis, Chromatography and Radio isotopes: application in medicine and basic research.	3
II	Sample Collection a. Blood, Anticoagulants b. Random urine sample, 24 hours urine sample, Preservatives	1
III	Preparation of Solutions (Molar, Normal, Percentage and Saturated) Preparation of Buffers, pH determination	2

IV	Reactions of Carbohydrates (Practical) (Glucose, Fructose, Lactose, Sucrose)	3
V	Urine Analysis – Normal constituents (Organic & Inorganic) & Abnormal constituents by Dipstic method (Practical)	2
VI	Clinical Significance of - Blood Glucose, Blood Urea, Serum Creatinine, Electrolytes, Serum bilirubin, Lipid profile and ABG.	4

MEDICAL LAW AND ETHICS

SYLLABUS

Hours: Theory 15

Credits: Theory 01

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.[28]

Medical ethics has developed into a well based discipline which acts as a "bridge" between theoretical bioethics and the bedside. The goal is "to improve the quality of patient care by identifying, analyzing, and attempting to resolve the ethical problems that arise in practice".[28] Doctors are bound by, not just moral obligations, but also by laws and official regulations that form the legal framework to regulate medical practice. Hence, it is now a universal consensusthat legal and ethical considerations are inherent and inseparable parts of good medical practice across the whole spectrum. Few of the important and relevant topics that need to focus on are asfollows:

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

PHYSICAL OPTICS

INSTRUCTOR IN CHARGE: A post-graduate, preferably a Ph D, in physics, with adequate exposure to the profession of optometry as evidenced by previous teaching experience or publications in optometry journals/magazines OR An optometrist with a post-graduate degree, preferably a Ph D OR An optometrist with an undergraduate degree

COURSE DESCRIPTION: This course will be taught in one semester. Physical Optics is the study of light, its properties and its interaction with matter. Specifically, the phenomena of interference, diffraction, polarization and scattering will be dealt with in detail.

OBJECTIVES: 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.

TEXT BOOK: Subrahmanyan 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.

PREREQUISITES: Higher secondary level mathematics and physics.

SYLLABUS
Theory : 15 hours Credits 1

NO. OF UNITS	TOPICS	NO OF HRS.
I	Nature of light –light as electromagnetic oscillation –wave equation; ideas of sinusoidal oscillations –simple harmonic oscillation; transverse nature of oscillation;concepts of frequency, wavelength, amplitude and phase. Sources of light; Electromagnetic Spectrum.	3
II	Polarized light; linearly polarized light; and circularly polarized light. Intensity of polarized light; Malus'Law; polarizers and analyzers; Methods of producing polarized light; Brewster's angle. Birefringence; ordinary and extraordinary rays.	3
III	Relationship between amplitude and intensity. Coherence; interference; constructive interference, destructive interference; fringes; fringe width. Double slits, multiple slits, gratings.	3
IV	Diffraction; diffraction by a circular aperture; Airy's disc Resolution of an instrument (telescope, for example); Raleigh's criterion Scattering; Raleigh's scattering; Tyndall effect. Fluorescence and Phosphorescence	3

V	Basics of Lasers –coherence; population inversion; spontaneous emission; Einstein's theory of lasers. Radiometry; solid angle; radiometric units; photopic and scotopic luminous efficiency and efficacy curves; photometric units Inverse square law of photometry; Lambert's law. Other units of light measurement; retinal illumination; Trolands	3

Each practical session could be evaluated for 10 marks and the total could be added to the final evaluations. These practical could be customized as per the university requirements and spaced apart conveniently. The practical to be done include the following:

1. Gratings – determination of grating constant using Sodium vapor lamp; determination of wavelengths of light from Mercury vapor lamp
2. Circular Apertures – measurements of Airy's disc for apertures of various sizes
3. Verification of Malus' Law using a polarizer – analyzer combination
4. Demonstration of birefringence using Calcite crystals
5. Measurement of the resolving power of telescopes.
6. Newton's rings
7. Demonstration of fluorescence and phosphorescence using crystals and paints

GEOMETRICAL OPTICS

INSTRUCTOR IN CHARGE : A post-graduate, preferably a Ph D, in physics, with adequate exposure to the profession of optometry as evidenced by previous teaching experience or publications in optometry journals/magazines OR An optometrist with a post-graduate degree, preferably a Ph D OR An optometrist with an undergraduate degree

COURSE DESCRIPTION: This course will be taught in two consecutive semesters. Geometric Optics is the study of light and its behaviour as it propagates in a variety of media. Specifically, the phenomena of reflection and refraction of light at boundaries between media and subsequent image formation will be dealt with in detail. Reflections at plane and spherical surfaces and refractions at plane, spherical, cylindrical and toric surfaces will be studied in this course. Attention will be given to the system of surfaces and/or lenses and their imaging properties. The effect of aperture stops on the quality of images, such as blur and aberrations, depth of field and depth of focus, will also be studied

OBJECTIVES: 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.

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.

PREREQUISITES: Higher secondary level mathematics and physics.

SYLLABUS
Theory : 15 hours Credit 01

NO. OF UNITS	TOPICS	NO. OF HOURS
I	1. Vergence and vergence techniques revised. 2. Gullstrand's schematic eyes, visual acuity, Stile Crawford 3. Emmetropia and ametropia	3
II	4. Blur retinal Imaginary 5. Correction of spherical ammetropia, vertex distance and effective power, dioptric power of the spectacle, to calculate the dioptoric power, angular magnification of spectacles in aphakic	3
III	6. Thin lens model of the eye –angular magnification –spectacle and relative spectacle magnification.	3

	7. Aperture stops- entrance and exit pupils. 8. Astigmatism. - To calculate the position of the line image in a sphero-cylindrical lens.	
IV	9. Accommodation –Accommodation formulae and calculations. 10. Presbyopia- Spectacle magnification, angular magnification of spectacle lens, near point,calculation of add, depth of field.	3
V	11. Spatial distribution of optical information- modulation transfer functions- Spatial filtering-applications. 12. Visual optics of aphakia and pseudophakia.	3

CLINICAL OPTOMETRY

Total: 360 hours

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.

SEMESTER – III

BASICS OF PATIENT CARE

INTRODUCTION:

This course develops knowledge and skills basic to patient care undergoing radiographic procedures. Topics include patient communication, patient assessment, and safety of patient and healthcare provider in the health care facility. Focus extends to include proper body mechanics and patient positioning to promote comforting for patient. Basics of infection control and methods of medical asepsis were focused on especially when dealingwith patients undergoing certain invasive procedures. Finally describe and perform basic procedures like injections, Ryle's tube, Foley's catheterization, taking blood samples, wound dressing etc.

COURSE OBJECTIVES:

1. Students will gain understanding of the fundamental concepts of patients care whilein the hospital or undergoing a special procedure.
2. Students will become familiar with some procedures relevant to patient condition
3. Students will be able to provide certain basic procedures and identify symptoms ofaltered cognition.
4. Students will be able to relate them to patient overall health and well being.
5. Relationship between certain procedures, radiographic procedure, and patientoverall health will be emphasized.

SYLLABUS:

LEARNING OUTCOMES:

The main Intended Learning Outcome (ILO) that is measured throughout this course is "Critical Thinking." This ILO is conceptually defined as "a cognitive process that aims at using the rational and logical examination of ideas for the purposes of understanding, problem solving, and decision-making." Critical thinking will facilitate the process of teaching/ learning, which is originally a change in thinking or behaviour.

I- Caring

II- Communication

III- Critical thinking

IV- Therapeutic intervention

V - Leadership

VI- Employer's satisfaction

SYLLABUS

THEORY: 30hrs & 2 Credit

NO. OF UNITS	CONTENT	NO. OF HOURS
I	**Describe the principles of careof bedridden patient** - Care of a bedridden patient - Patient assessment - Assessing personal concerns of patient - Assessing physiological needs Assessing current physical status **Describe the basicprinciples of communication** Communication with patients and attendants - Communication skills - Communication with patients - Special circumstances in communication - Patient education - Communication with patient's families Dealing with death and loss	3
II	**Describe and demonstrate techniques to maintain patient hygiene** Patient hygiene - Cycle of infection - Body's defence against infection - Infectious diseases - Maintaining hygiene **Describe and practice infection control measures in the ward and ICU** Infection control measures in the ward and ICU - Microorganisms - Cycle of infection - Hand Washing Preventing disease transmission	3
III	**Describe and record vital data and basic clinicalparameters** Vital data and basic clinical parameters -Assessment of body temperature: sites,equipments and techniques, special considerations - Assessment of pulse: Sites, location ,equipments and technique, special consideration - Assessment of respirations: technique,special Consideration Recording of vital signs **Describe and demonstrate howto monitor patients** Patients monitoring Assessing personal concerns of patient - Assessing physiological needs - History taking - Physical assessment	3

IV	**Describe the principles of patient safety** - Patient transfer - Restraints and immobilization - Accidents and incident reports - Fire hazards Other common hazards **Describe and demonstrate the principles of cleaning, disinfection and sterilization in thehospital wards/ ICU** - Hand washing: simple, hand antisepsis andsurgical antisepsis (scrub) - Isolation: source and protective -Sterile packs - Surgical scrubbing - Gowning and gloving -Sterilization - Fumigation Autoclaving **Describe the common routesfor drug administration** -Assess the patient's condition - Recognize different definitions associatedwith pharmacology - Recognize various classifications of drugs - Identify the ten rights of drug administration - List out common routes and methods ofdrug administration Perform venipuncture using appropriateuniversal Precautions	3
V	**Describe and perform basic procedures** -Injections, -Ryle's tube, -Foley's catheterization, -Taking blood samples, -Wound dressing **Describe and demonstrate documentation ofpatient related data in thecase sheet records** -History taking data sheet - Documentation: Purpose of Recording and reporting, Communication within the HealthCare Team, - Types of records; ward records, medical/nursing records, Common Record-keeping forms, Computerized documentation **Describe and demonstrate useof basic hospital equipment** Use of basic hospital equipment	3

COURSE OUTCOMES:

1. Perform basic infection control practices in the Healthcare setting.
2. Use effective skills to draw blood and accurately label tubes
3. Perform basic procedures using advanced technique and interpretation.

4. Perform basic patient care skills.
5. Communicate with a diverse patient population using written and oralcommunication and listening skills in interactions.

REFERENCES:

1. Ehrlich, R., A., McCloskey, E. D., & Daly, J., A. (2004). *Patient Care in Radiography with an Introduction to Medical Imaging.* Mosby: An Affiliate of Elsevier. Sixth edition.
2. Adler, A., M., & Carlton, R., R. (2007). *Introduction to Radiologic Sciences and Patient Care*. Saunders: Elsevier. Fourth edition
3. Torres, L.,S. (1989). *Basic Medical Techniques and Patient Care for Radiologic Technologists*. J. B.Lippincott Company: Philadelphia. Third Edition.

MICROBIOLOGY

INTRODUCTION:

The goal of teaching Microbiology is to provide understanding of the natural history of infection and diseases in order to deal with the Etiology, pathogenesis, Pathogen city, laboratory diagnosis, treatment control and prevention of these infections and infectious diseases.

COURSE OBJECTIVES:

- Plan and interpret Laboratory investigations for diagnosis of infectious diseasesand correlate the clinical manifestations with the etiological agent.
- Perform simple laboratory test which help to arrive at rapid diagnosis.
- Understand methods of disinfection and sterilization and their application to
- Control and prevention of hospital acquired infections.

SYLLABUS

Credits: Theory 04 & Practical 0.5

Hours: Theory 60 & Practical 15

NO. OF UNITS	TOPICS	NO. OF HOURS
I	**General Bacteriology** Morphology • Classification of microorganisms, size, shape and structure of bacteria. • Use of microscope in the study of bacteria • Growth and nutrition • Nutrition, growth and multiplication of bacteria • Culture media, Culture methods & AST	4
	Immunology • Immunity & types of immunity • Antigen & Antibody • Antigen-Antibody reactions • Structure & functions of immune system • Immune response • Hypersensitivity • Autoimmunity • Vaccines & National Immunization schedule	8
	Systematic Bacteriology Staphylococci, Streptococci, Pneumococci, Gonococci, Meningococci, C. diphtheriae, Mycobacteria, Clostridia, Bacillus, Shigella, Salmonella, E. coli, Klebsiella, Proteus, Vibrio cholerae, Pseudomonas & Spirochetes. Miscellaneous bacteria	18

II	**Sterilization and Disinfection** • Principles and use of equipment of sterilization namely hot air oven, autoclave and serum inspissator, pasteurization. • Chemical methods of sterilization (like ETO & Plasma sterilization) Disinfectants and Antiseptic agents used in the hospital.	**2**
	Hospital Infection • HAIs- prevention and control (Standard precautions, Transmission based precautions & Bundle care).	**2**
	Principles and practice of Biomedical waste management	**1**
III	**Parasitology** Morphology, life cycle, laboratory diagnosis of following parasites: • E. histolytica • Free living amoeba • Hydatid disease • Plasmodium • Tape worms • Intestinal nematodes • Somatic nematodes	**10**
IV	**Mycology** • General Mycology • Superficial Mycoses • Subcutaneous Mycoses • Systemic Mycoses • Opportunistic fungi	**5**
V	**Virology** • General Virology • Herpes • Arbo viruses • Influenza, Parainfluenza, Corona • Hepatitis • HIV • Rabies • Poliomyelitis.	**10**

PRACTICALS		
NO. OF UNITS	**TOPICS**	**NO. OF HOURS**
I	Specimen collection and handling	2
	Microscopy & Hanging drop preparation	1
	Slide preparation and staining • Gram staining • Acid fast staining	3
	• KOH mount • Fungal culture	1
II	Serology • Rapid tests • ELISA demo	1
III	Standard precautions-	1

	• Hand hygiene	
	PPE (donning & doffing)	1
	• Spill management • NSI (Needle stick injury)	1
	• Cough etiquette • Safe injection practices	1
IV	Sterilization & Disinfection of instruments	2
V	Biomedical waste management	1

COURSE OUTCOMES:

- Knowledge about the association of Micro-organisms in Disease and Health Requirement and the common pathogens of Medical importance
- Know about the commonly used Microbiology Laboratory equipment and the cleaning of glassware
- Know about Collection, Transportation and processing of clinical samples for Microbiological Investigations
- Knowledge about Sterilization and Disinfection practices
- Development of skills of Media pouring
- Slide and Smear preparation
- Performing Staining techniques in Microbiology (Simple staining, Gram's staining, AFB staining)

REFERENCES:

- Ananthanarayan and Paniker's Textbook of Microbiology – 10th edition
- Textbook of Microbiology C P Baveja

PATHOLOGY

INTRODUCTION

The goal of teaching Pathology is to provide comprehensive knowledge of the causes and mechanisms of the duties in order to enable to achieve complete understanding of the natural history and clinical manifestation of the diseases.

COURSE OBJECTIVES:

- To describe the rationale and principles of technical procedures of diagnostic laboratorytests.
- To know about basic diagnostic tests and correlate with clinical and morphological features of diseases.
- To learn about commonly used bedside tests on blood, urine and other relevant samples.

SYLLABUS

Credits: Theory 4 & Practical 0.5

Hours: Theory 60 & Practical 15

NO. OF UNIT	CONTENT	NO. OF HOURS
I	**Cell Injury** Adaptations Necrosis Apoptosis Types, Mechanisms of cell injury	4
	Inflammation Signs, Mechanisms, chemical Mediators & outcomes of Inflammation Acute Phase reactants and Granulomatous inflammation	4
	Tissue Repair & Regeneration	1
	Hemodynamics Hyperemia, congestion, edema Thrombosis Embolism Infarction & Shock	5
	Neoplasia Differences between benign & malignant tumors, invasion & Metastasis, features of malignancy, Causes of cancer	3

	Infections TB Leprosy, syphilis HIV Malaria	6
II	**Hematology** Anemia- Definition & classification Iron Deficiency Anemia, Megaloblastic anemia, Hemolytic anemia Blood grouping Causes & definition - Leukocytosis,leucopenia, Leukemoid reaction, BT, CT, PT, APTT, thrombocytosis, thrombocytopenia, splenomegaly	6
III	**GIT- 1** Peptic ulcer, Barrett`s esophagus	1
	Hepatobiliary system Jaundice Cirrhosis-definition & causes, Viral Hepatitis – causes. Modes of transmission	2
	Endocrine Diabetes- subtypes and differences, complications and diagnosis, hypo and hyperthyroidism	2
IV	**Blood vessels** Atherosclerosis HTN –types, causes & diagnosis	2
	CVS Myocardial infarction- etiopathogenesis, Lab diagnosis Rheumatic fever	2
	Lung COPD Asthma, pneumonia	3
V	**Kidney** ARF- definition & causes, CRF- definition & causes Renal stones Classification of renal diseases, congenital abnormalities of urinary system Glomerular diseases: causes, types & pathology (Nephritic , nephrotic syndrome) Tubulointerstitial disorders- ATN, TIN,	18

	Pyelonephritis & tuberculous pyelonephritis Renal vascular disorders End stage renal disease: causes & pathology Pathology of kidney in hypertension, pregnancy & diabetes Pathology of peritoneum, peritonitis, bacterial, tubular & sclerosing peritonitis, dialysis induced changes Pathology of urinary tract infections	
	CNS Meningitis – causes, routes of spread, CSF findings, encephalitis	1

PRACTICALS TOPICS	**NO. OF HOURS**
Blood Grouping	1
Peripheral smear	2
Urine examination	2
Slides	2
Specimens	3
Charts, interpretation of CBP, BT, CT, PT, APTT	4
Instruments	1

COURSE OUTCOMES:

- At the end, the students shall be able to describe the rationale and principles of technical procedures of diagnostic laboratory tests.
- Interpret diagnostic laboratory test and correlate with clinical and morphological features of diseases.
- Perform simple bedside tests on blood, urine and other biological fluid samples.

REFERENCES:

- Pathologic basis of disease – Robbins & Cotran 10th edition
- Pathology – Harshmohan 8th edition
- Textbook of Pathology for Allied Health Sciences – Ramdas Nayak
- Textbook on Pathology for DMLT and Paramedical courses – Dr. I.Clemen
- Essentials of Clinical Pathology – Shirish. M. Kawthalkar 2nd edition

VISUAL OPTICS I

INSTRUCTOR IN CHARGE: Optometrist with optics teaching experience. Preferablypostgraduate or undergraduate with more than 2 years of teaching experience.

COURSE DESCRIPTION: This course deals with the concept of eye as an optical instrument and thereby covers various optical components of eye, types of refractive errors, clinical approach in diagnosis and management of various types of refractive errors.

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.

TEXT BOOK:

1. A H Tunnacliffe: 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
5. T Grosvenor: Primary Care Optometry,4th edition, Butterworth –heinneman,USA,2002

PREREQUISITES: Geometrical optics, Physical optics, Ocular Physiology

SYLLABUS
Theory 15 Hours Credits 1

NO. OF UNITS	TOPICS	NO. OF HOURS
I	Review of Geometrical Optics: • Vergence and power • Conjugacy, object space and image space • Sign convention • Spherical refracting surface • Spherical mirror; catoptric power • Cardinal points • Magnification • Light and visual function • Clinical Relevance of: Fluorescence, Interference, Diffraction, Polarization, Bi-refringence, Dichroism • Aberration and application Spherical and Chromatic	3
II	Cornea and aqueous • Crystalline lens • Vitreous • Schematic and reduced eye	3
III	Measurements of Optical Constants of the Eye • Corneal curvature and thickness • Keratometry • Curvature of the lens and ophthalmophakometry • Axial and axis of the eye	3
IV	Basic Aspects of Vision. • Visual Acuity • Light and Dark Adaptation • Color Vision • Spatial and Temporal Resolution • Science of Measuring visual performance and application to Clinical Optometry	3
V	Refractive anomalies and their causes • Etiology of refractive anomalies • Contributing variability and their ranges • Populating distributions of anomalies • Optical component measurements • Growth of the eye in relation to refractive errors	3

OPTOMETRIC OPTICS-I

INSTRUCTOR IN CHARGE: Optometrist - B optom / M Optom/ Ph D / FBDO

COURSE DESCRIPTION: This course deals with understanding the theory behind spectacle lenses and frames, their materials, types, advantages and disadvantages, calculations involved, when and how to prescribe. It will impart construction, design application and development of lenses, particularly of the methods of calculating their power and effect.

OBJECTIVES: Skills/knowledge to be acquired at the end of this course: -

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, etc.)
3. Knowledge to select the tool power for grinding process.
4. Measurement of surface powers using lens measure.
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

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

PREREQUISITES: Physical Optics, Geometrical Optics

SYLLABUS
Theory 30hrs Credits 02

NO. OF UNITS	TOPICS	NO. OF HOURS
I	1. Introduction –Light, Mirror, Reflection, Refraction and Absorption 2. Prisms –Definition, properties, Refraction through prisms, Thickness difference, Base-apexnotation, uses, nomenclature and units, Sign Conventions, Fresnel's prisms, rotary prisms 3. Lenses –Definition, units, terminology used to describe, form of lenses	6

II	1. Vertex distance and vertex power, Effectivity calculations 2. Lens shape, size and types i.e. Spherical, cylindrical and Sphero-cylindrical	6
III	1. Transpositions –Simple, Toric and Spherical equivalent 2. Prismatic effect, centration, decentration and Prentice rule, Prismatic effect of Plano-cylinder and Spherocylinderlenses	6
IV	1. Spherometer & Sag formula, Edge thickness calculations 2. Magnification in high plus lenses, Minification in high minus lenses	6
V	1. Tilt induced power in spectacles 2. Aberration in Ophthalmic Lenses	6

OPTOMETRIC INSTRUMENTS

INSTRUCTOR IN CHARGE: Optometrist with experience in teaching instrument course (B Optom/M Optom/ Ph D) or Bioengineer with experience in teaching

COURSE DESCRIPTION: This course covers commonly used optometric instruments, its basic principle, description and usage in clinical practice.

OBJECTIVES: Upon completion of the course, the student should be able to gain theoretical knowledge and basic practical skill in handling the following instruments

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

PREREQUISITES: Geometrical optics

SYLLABUS
Theory: 30 hours Practical 15hrs.
Credits Theory 2 Practical 0.5

NO. OF UNITS	TOPICS	NO. OF HOURS
I	Refractive instruments Optotypes and MTF, Spatial Frequency Test charts standards. Choice of test charts Trial case lenses Refractor (phoropter) head units Optical considerations of refractor units Trial frame design Near vision difficulties with units and trial frames Retinoscope – types available Adjustment of Retinoscopes- special features Objective optometers. Infrared optometer devices. Projection charts Illumination of the consulting room. Brightness acuity test	10

	Vision analyzer Pupilometer Potential Acuity Meter Abberometer	
II	Ophthalmoscopes and related devices Design of ophthalmoscopes – illumination Design of ophthalmoscopes- viewing Ophthalmoscope disc Filters for ophthalmoscopy Indirect ophthalmoscope	5
III	1. Lensometer, Lens gauges or clock 2. Slit lamp	5
IV	1. Tonometers 2. Keratometer and corneal topography 3. Refractometer 4. Orthoptic Instruments (Synaptophore Only) 5. Color Vision Testing Devices	6
V	1. Fields of Vision And Screening Devices 2. Scans 3. ERG 4. New Instruments	4

PRACTICAL TOPICS	**NO. OF HOURS**
1. Visual Acuity chart/drum 2. Retinoscope 3. Trail Box 4. Jackson Cross cylinder 5. Direct ophthalmoscope 6. Slit lamp Biomicroscope 7. Slit lamp Ophthalmoscopy (+90, 78 D) 8. Gonioscope 9. Tonometer: Applanation Tonometer 10. Keratometer 11. Perimeter 12. Electrodiagnostic instrument (ERG, VEP, EOG) 13. A –Scan Ultrasound 14. Lensometer	**15**

OCULAR DISEASES I

INSTRUCTOR IN CHARGE: Ophthalmologist or Optometrist with teaching experience (B Optom/ M Optom/ Ph D)

COURSE DESCRIPTION: This course deals with various ocular diseases affecting various parts of the eyes. It covers clinical signs and symptoms, cause, pathophysiological mechanism, diagnostic approach, differential diagnosis and management aspects of the ocular diseases.

OBJECTIVES: 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.

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

PREREQUISITES: Ocular anatomy and Ocular Physiology, Biochemistry andMicrobiology, Pharmacology

SYLLABUS
Theory: 30 hours Credits 02

NO. OF UNITS	TOPICS	NO. OF HOURS
I	1. Orbit 1.1. Applied Anatomy 1.2. Proptosis (Classification, Causes, Investigations) 1.3. Enophthalmos 1.4. Developmental Anomalies (craniosynostosis, Craniofacial Dysostosis, Hypertelorism,Median facial cleft syndrome) 1.5. Orbital Inflammations (Preseptal cellulites, Orbital cellulitis Orbital Periostitis,cavernous sinus Thrombosis) 1.6. Grave's Ophthalmopathy 1.7. Orbital tumors(Dermoids, capillary haemangioma, Optic nerve glioma)	10

	1.8. Orbital blowout fractures 1.9. Orbital surgery (Orbitotomy) 1.10. Orbital tumors 1.11. Orbital trauma 1.12. Approach to a patient with proptosis	
II	2. Lids 2.1 Applied Anatomy 2.2 Congenital anomalies (Ptosis, Coloboma, Epicanthus, Distichiasis, Cryptophthalmos) 2.3 Oedema of the eyelids(Inflammatory, Solid, Passive edema) 2.4 Inflammatory disorders (Blepharitis, External Hordeolum, Chalazion ,Internalhordeolum, Molluscum Contagiosum) 2.5 Anomalies in the position of the lashes and Lid Margin (Trichiasis, Ectropion, Entropion, Symblepharon, Blepharophimosis, Lagophthalmos, Blepharospasm, Ptosis). 2.6 Tumors (Papillomas, Xanthelasma, Haemangioma, Basal carcinoma, Squamous cell carcinoma, sebaceous gland melanoma) 3. Lacrimal System 3.1 Applied Anatomy 3.2 Tear Film 3.3 The Dry Eye (Sjogren's Syndrome) 3.4 The watering eye (Etiology, clinical evaluation) 3.5 Dacryocystitis 3.6 Swelling of the Lacrimal gland(Dacryoadenitis)	5
III	4. Conjunctiva 4.1 Applied Anatomy 4.2 Inflammations of conjunctiva (Infective conjunctivitis – bacterial, chlamydial, viral ,Allergic conjunctivitis, Granulomatous conjunctivitis) 4.3 Degenerative conditions(Pinguecula, Pterygium, Concretions) 4.4 Symptomatic conditions(Hyperaemia, Chemosis, Ecchymosis, Xerosis, Discoloration) 4.5 Cysts and Tumors	5
IV	5. Cornea 5.1 Applied Anatomy and Physiology 5.2 Congenital Anomalies (Megalocornea, Microcornea, Cornea plana, Congenital cloudycornea) 5.3 Inflammations of the cornea (Topographical classifications: Ulcerative keratitis andNon ulcerative 5.4 Etiological classifications: Infective, Allergic, Trophic, Traumatic, Idiopathic) 5.5 Degenerations (classifications, Arcussenilis, Vogt's white limbal girdle, Hassal-henle bodies, Lipoid Keratopathy, Band shaped keratopathy, Salzmann's nodular degeneration, Droplet keratopathy, Pellucid Marginal degeneration) 5.6 Dystrophies (Reis Buckler dystrophy,Recurrent corneal erosion syndrome, Granular dystrophy, Lattice dystrophy, Macular dystrophy, cornea	6

	guttata, Fuch's epithelial endothelial dystrophy, Congenital hereditary endothelial dystrophy) 5.7 Keratoconus, Keratoglobus 5.8 Corneal oedema, Corneal opacity, Corneal vascularisation 5.9 Penetrating Keratoplasty	
V	6 Uveal Tract and Sclera 6.1 Applied Anatomy, 6.2 Classification of uveitis 6.3 Etiology 6.4 Pathology 6.5 Anterior Uveitis 6.6 Posterior Uveitis 6.7 Purulent Uveitis 6.8 Endophthalmitis 6.9 Panophthalmitis 6.10 Pars Planitis 6.11 Tumors of uveal tract(Melanoma) 6.12 Episcleritis and scleritis 6.13 Clinical examination of Uveitis and Scleritis	4

CLINICAL EXAMINATION OF THE VISUAL SYSTEM

INSTRUCTOR IN CHARGE: B Optom or higher optometry degree or Ophthalmologist can teach this course

COURSE DESCRIPTION: This course covers various clinical optometry procedures involving external examination, anterior segment and posterior segment examination, neuroophthalmic examination, paediatric optometry examination, and Glaucoma evaluation.

OBJECTIVES: At the end of the course the students will be skilled in knowing the purpose, set-up and devices required for the test, indications and contraindications of the test, step-by-step procedures, documentation of the findings, and interpretation of the findings of the various clinical optometry procedures

TEXT BOOK: T Grosvenor: Primary Care Optometry, 5th edition, Butterworth –Heinneman, USA, 2007.

REFERENCE BOOKS:

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

PREREQUISITES: Optometric Instruments, Pharmacology

SYLLABUS
Theory: 15hours/Practical : 15 hours
Credits Theory 01 Practical 0.5

NO. OF UNITS	TOPICS	NO. OF HOURS
I	1. History taking 2. Visual acuity estimation 3. Extraocular motility, Cover teat, Alternating cover test 4. Hirschberg test, Modified Krimsky	3
II	5. Pupils Examination 6. Maddox Rod 7. Van Herrick 8. External examination of the eye, Lid Eversion	3

III	9. Schirmer's, TBUT, tear meniscus level, NITBUT (keratometer), 10. Color Vision 11. Stereopsis 12. Confrontation test	3
IV	13. Photostress test 14. Slit lamp biomicroscopy 15. Ophthalmoscopy 16. Tonometry	3
V	17. ROPLAS 18. Amsler test 19. Contrast sensitivity function test 20. Saccades and pursuit test	3

NO. OF UNITS	TOPICS	NO. OF HOURS
I	1. History taking 2. Visual acuity estimation 3. Extraocular motility, Cover teat, Alternating cover test 4. Hirschberg test, Modified Krimsky	3
II	5. Pupils Examination 6. Maddox Rod 7. Van Herrick 8. External examination of the eye, Lid Eversion	3
III	9. Schirmer's, TBUT, tear meniscus level, NITBUT (keratometer), 10. Color Vision 11. Stereopsis 12. Confrontation test	3
IV	13. Photostress test 14. Slit lamp biomicroscopy 15. Ophthalmoscopy 16. Tonometry	3
V	17. ROPLAS 18. Amsler test 19. Contrast sensitivity function test 20. Saccades and pursuit test	3

CLINICAL OPTOMETRY II

Total: 210 hours

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.

SEMESTER – IV

OPTOMETRIC OPTICS II & DISPENSING OPTICS

INSTRUCTOR INCHARGE: Optometrist (M.Optom/Ph D). Practicing Optometrists with experience in Optical Dispensing & Optical Laboratory In-charge

COURSE DESCRIPTION: This course deals with understanding the theory behind spectacle lenses and frames, their materials, types, advantages and disadvantages, calculations involved, when and how to prescribe. It will impart construction, design application and development of lenses, particularly of the methods of calculating their power and effect. In addition deals with role of optometrists in optical set-up.

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
6. Art and science of dispensing spectacle lens and frames based on the glass prescription.
7. Reading of spectacle prescription. Counselling 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

TEXT BOOK/REFERENCE BOOKS:

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

PREREQUISITES: Geometrical Optics, Physical Optics & Ocular Physiology, Optomteric Optics - I

SYLLABUS
Theory : 30 hours Credits 02

NO. OF UNITS	TOPICS	NO. OF HOURS
I	Spectacle Lenses - II: • Manufacture of glass • Lens materials • Lens surfacing • Principle of surface generation and glass cements • 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)	**5**
II	Spectacle Frames: • 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	**5**
III	Tinted & Protective Lenses • Characteristics of tinted lenses Absorptive Glasses • Polarizing Filters, Photochromic & Reflecting filters • Safety lenses-Toughened lenses, Laminated Lenses, CR 39, Polycarbonatelenses	**5**
IV	Multifocal Lenses: • Introduction, history and development, types • Bifocal lenses, Trifocal & Progressive addition lenses	**5**
	Reflection from spectacle lens surface & lens coatings: • Reflection from spectacle lenses - ghost images -Reflections in bifocals at thedividing line • Antireflection coating, Mirror coating, Hard Multi Coating [HMC],Hydrophobic coating	**5**
V	Miscellaneous Spectacle: • Iseikonic lenses • Spectacle magnifiers • Recumbent prisms • Fresnel prism and lenses • Lenticular &Aspherical lenses • High Refractive index glasses	**5**

DISPENSING OPTICS:

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

VISUAL OPTICS II

INSTRUCTOR INCHARGE: Optometrist (M.Optom/Ph D)

COURSE DESCRIPTION: This course deals with the concept of eye as an optical instrument and thereby covers different optical components of eye, types of refractive errors, clinical approach in diagnosis and management of various types of refractive errors.

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.

TEXT BOOK/REFERENCE BOOKS:

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

PREREQUISITES: Geometrical Optics, Physical Optics & Ocular Physiology, Visual optics -I

SYLLABUS
Theory : 30 hours Credits 02

NO. OF UNITS	TOPICS	NO. OF HOURS
I	Accommodation & Presbyopia • Far and near point of accommodation • Range and amplitude of accommodation • Mechanism of accommodation • Variation of accommodation with age • Anomalies of accommodation • Presbyopia • Hypermetropia and accommodation	**6**

II	Convergence: • Type, Measurement and Anomalies • Relationship between accommodation and convergence-AC/A ratio	**3**
III	Objective Refraction (Static & Dynamic) • Streak retinoscopy • Principle, Procedure, Difficulties and interpretation of findings • Transposition and spherical equivalent • Dynamic retinoscopy various methods • Radical retinoscopy and near retinoscopy • Cycloplegic refraction	**8**
IV	Subjective Refraction: • Principle and fogging • Fixed astigmatic dial(Clock dial),Combination of fixed and rotator dial(Fan andblock test),J.C.C • Duochrome test o Binocular balancing- alternate occlusion, prism dissociation, dissociateDuochrome balance, Borish dissociated fogging o Binocular refraction-Various techniques	**8**
V	Effective Power &Magnification : • Ocular refraction vs. Spectacle refraction • Spectacle magnification vs. Relative spectacle magnification • Axial vs. Refractive ammetropia, Knapp's law • Ocular accommodation vs. Spectacle accommodation • Retinal image blur-Depth of focus and depth of field	**5**

OCULAR DISEASE II

INSTRUCTOR INCHARGE: Ophthalmologist

CO-INSTRUCTORS: Optometrist (Minimum UG in Optometry)

COURSE DESCRIPTION: This course deals with various ocular diseases affecting various parts of the eyes. It covers clinical signs and symptoms, cause, pathophysiological mechanism, diagnostic approach, differential diagnosis and management aspects of the ocular diseases.

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

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

PREREQUISITES: Ocular anatomy and Ocular Physiology, Ocular Biochemistry and Microbiology, Ocular Disease – I

SYLLABUS

Theory:30 hours Credit 02

NO. OF UNITS	TOPICS	NO. OF HOURS
I	Retina and Vitreous: • Applied Anatomy • Congenital and Developmental Disorders (Optic Disc: Coloboma, Drusen,Hypoplasia, Medullated nerve fibers; Persistent Hyaloid Artery) • Inflammatory disorders (Retinitis : Acute purulent , Bacterial, Virus, mycotic) • Retinal Vasculitis (Eales's) • Retinal Artery Occlusion (Central retinal Artery occlusion) • Retinal Vein occlusion (Ischaemic, Non Ischaemic , Branch retinal veinocclusion) • Retinal degenerations : Retinitis Pigmentosa, Lattice degenerations • Macular disorders: Solar retinopathy, central serous retinopathy, cystoid macularedema, Age related macular degeneration. • Retinal Detachement: Rhegmatogenous, Tractional, Exudative) • Retinablastoma • Diabetic retinopathy	**10**
II	Ocular Injuries: Terminology : Closed globe injury (contusion, lamellar laceration) Openglobe injury (rupture, laceration, penetrating injury, perforating injury) • Mechanical injuries (Extraocular foreign body, blunt trauma, perforating injury,sympathetic ophthalmitis) • Non Mechanical Injuries (Chemical injuries, Thermal, Electrical, Radiational) • Clinical approach towards ocular injury patients	**3**
III	Lens • Applied Anatomy and Physiology • Clinical examination • Classification of cataract • Congenital and Developmental cataract • Acquired (Senile, Traumatic, Complicated, Metabolic, Electric, Radiational,Toxic) • Morphological: Capsular, Subcapsular, Cortical, Supranuclear, Nuclear, Polar. • Management of cataract (Non-surgical and surgical measures; preoperativeevaluation, Types of surgeries,) • Complications of cataract surgery • Displacement of lens: Subluxation, Displacement • Lens coloboma, Lenticonus, Microsperophakia.	**7**
IV	Clinical Neuro-ophthalmology	**5**

	• Anatomy of visual pathway • Lesions of the visual pathway • Pupillary reflexes and abnormalities (Amaurotic light reflex, Efferent pathway defect, Wernicke's hemianopic pupil, Marcus gunn pupil. Argyll Robetson pupil, Adie's tonic pupil) • Optic neuritis, Anterior Ischemic optic neuropathy, Pappilloedema, optic atrophy • Cortical blindness • Malingering • Nystagmus • Clinical examination	
V	Glaucoma • Applied anatomy and physiology of anterior segment • Clinical Examination • Definitions and classification of glaucoma • Pathogenesis of glaucomatous ocular damage • Congenital glaucoma's • Primary open angle glaucoma • Ocular hypertension • Normal Tension Glaucoma • Primary angle closure glaucoma (Primary angle closure suspect, Intermittentglaucoma, acute congestive, chronic angle closure) • Secondary Glaucoma's • Management : common medications, laser intervention and surgical techniques	**5**

BASIC AND OCULAR PHARMACOLOGY

INSTRUCTOR INCHARGE: Pharmacologist/Ophthalmologist

COURSE DESCRIPTION: This course covers the actions, uses, adverse effects and mode of administration of drugs, especially related to eyes.

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.

TEXT BOOK/REFERENCE BOOKS:

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

PREREQUISITES: General Physiology & Biochemistry

SYLLABUS
Theory : 30 hours Credits 02

NO. OF UNITS	TOPICS	NO. OF HOURS
I	General Pharmacology: Introduction & sources of drugs, Routes of drug administration,Pharmacokinetics (emphasis on ocular pharmacokinetics), Pharmacodynamics & factors modifying drug actions	**5**
II	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,	**10**
III	Opioids & non-opioids; Chemotherapy : Introduction on general chemotherapy, Specific chemotherapy –Antiviral, antifungal, antibiotics; Hormones : Corticosteroids, Antidiabetics; Blood Coagulants	**5**
IV	Ocular Pharmacology: Ocular preparations, formulations and requirements of an ideal agent; Ocular Pharmacokinetics, methods of drug administration & Special drug deliverysystem; Ocular Toxicology	**5**

V	Diagnostic & Therapeutic applications of drugs used in Ophthalmology: Diagnostic Drugs & biological agents used in ocular surgery, Anaesthetics used in ophthalmic procedures, Anti-glaucoma drugs; Pharmacotherapy of ocular infections –Bacterial, viral, fungal & chlamydial; Drugs used in allergic, inflammatory& degenerative conditions of the eye; Immune modulators in Ophthalmic practice, Wetting agents & tear substitutes ,Antioxidants	**5**

CLINICAL OPTOMETRY III

Total Hours: 420 hours

Students will improve their skills in clinical procedures, and then progressive interactions with patients and professional personal are monitored as students practice optometry in supervised setting. Additional area includes problem solving and complications of various managements will be inculcated. Students should have exposure to eye bank facilities and must be made aware of eye donation, collection of eyes, preservation, pre and post-operative instructions and latest techniques for preservation of donor cornea. The students will get clinical training on the practical aspects of the following courses namely optometric optic –II & dispensing optics, visual optics – II and ocular disease -II.

SEMESTER – V

CONTACT LENSES I

INSTRUCTOR INCHARGE: B.Optom or optometrists with higher qualification**.**

COURSE DESCRIPTION: The subject provides the student with suitable knowledge both in theoretical and practical aspects of Contact Lenses.

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

TEXT BOOKS:

1. IACLE modules 1 - 10
2. CLAO Volumes 1, 2, 3
3. Anthony J. Phillips : Contact Lenses, 5thedition, 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

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

SYLLABUS
Theory: 15hours Practical: 15 hours
Credits Theory 1 Practical 0.5

NO. OF UNITS	TOPICS	NO. OF HOURS
I	1. Introduction to Contact lenses 1.1 Definition 1.2 Classification / Types 2. History of Contact Lenses 3. Optics of Contact Lenses 3.1 Magnification & Visual field 3.2 Accommodation & Convergence 3.3 Back & Front Vertex Power / Vertex distance calculation 4. Review of Anatomy & Physiology of 4.1 Tear film	**3**

	4.2 Cornea 4.3 Lids & Conjunctiva 5. Introduction to CL materials 5. 1 Monomer, Polymers	
II	6. Properties of CL materials 6.1 Physiological (Dk, Ionicity, Water content) 6.2 Physical (Elasticity, Tensile strength, Rigidity) 6.3 Optical (Transmission, Refractive index) 7. Indications and contraindications 8. Parameters / Designs of Contact Lenses & Terminology	**3**
III	9. RGP Contact Lens materials 10. Manufacturing Rigid and Soft Contact Lenses – various methods 11. Pre-Fitting examination – steps, significance, recording of results 12. Correction of Astigmatism with RGP lens 13. Types of fit – Steep, Flat, Optimum – on spherical cornea with spherical lenses 14. Types of fit – Steep, Flat, Optimum – on Toric cornea with spherical lenses	**3**
IV	15. Calculation and finalising Contact lens parameters 16. Ordering Rigid Contact Lenses – writing a prescription to the Laboratory 17. Checking and verifying Contact lenses from Laboratory 18. Modifications possible with Rigid lenses 19. Common Handling Instructions 19.1 Insertion & Removal Techniques 19.2 Do's and Dont'	**3**
V	20. Care and Maintenance of Rigid lenses 20.1Cleaning agents & Importance 20.2 Rinsing agents & Importance 20.3 Disinfecting agents & importance 20.4 Lubricating & Enzymatic cleaners 21. Follow up visit examination 22. Complications of RGP lenses	**3**

PRACTICAL TOPICS	**NO. OF HOURS**
1. Measurement of Ocular dimensions 2. Pupillary diameter and lid characteristics 3. Blink rate and TBUT 4. Schrimers test, Slit lamp examination of tear layer 5. Keratometry 6. Placido's disc 7. Soft Contact Lens fitting – Aspherical 8. Soft Contact Lens fitting – Lathecut lenses 9. Soft Contact Lens over refraction 10. Lens insertion and removal	**15**

11. Lens handling and cleaning 12. Examination of old soft Lens 13. RGP Lens fitting 14. RGP Lens Fit Assessment and fluorescein pattern 15. Special RGP fitting (Aphakia, pseudo phakia & Keratoconus) 16. RGP over refraction and Lens flexure 17. Examination of old RGP Lens 18. RGP Lens parameters **19.** Slit lamp examination of Contact Lens wearers	

LOW VISION CARE

INSTRUCTOR INCHARGE: Optometrist with Low vision clinical experience

COURSE DESCRIPTION: This course deal with the definition of low vision, epidemiology aspect of visual impairment, types of low vision devices and its optical principles, clinical approach of the low vision patients, assistive devices for totally visually challenged, art of prescribing low vision devices and training the low vision patients and other rehabilitation measures.

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

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 Heinnemann, 2007

SYLLABUS
Theory: 15hours Practical: 15 hours
Credits Theory 1 Practical 0.5

NO. OF UNITS	TOPICS	NO.OF HRS
I	1. Definitions & classification of Low vision 2. Epidemiology of low vision	**3**
II	1. Model of low vision service 2. Pre-clinical evaluation of low vision patients – prognostic & psychological factors; psycho-social impact of low vision	**3**
III	3. Types of low vision aids – optical aids, non-optical aids & electronic devices 4. Optics of low vision aids 5. Clinical evaluation – assessment of visual acuity, visual field,	**3**

	selection of low vision aids,instruction & training	
IV	6. Pediatric Low Vision care 7. Low vision aids – dispensing & prescribing aspects 8. Visual rehabilitation &counseling	**3**
V	9. Legal aspects of Low vision in India 10. Case Analysis	**3**

PRACTICALS TOPICS	**NO. OF HOURS**
Attending in low vision care clinic and history taking.	**15**
Determining the type of telescope and its magnification (Direct comparison method &calculated method) Determining the change in field of view with different magnification and different eyeto lens distances with telescopes and magnifiers.	
Inducing visual impairment and prescribing magnification. Determining reading speed with different types of low vision aids with same magnification. Determining reading speed with a low vision aid of different magnifications.	

GERIATRIC OPTOMETRY & PAEDIATRIC OPTOMETRY

INSTRUCTOR INCHARGE: B.Optom/ M Optom/ Ph D with adequate experience in handling geriatric patients or Ophthalmologists**.**

COURSE DESCRIPTION: This course deals with general and ocular physiological changes of ageing, common geriatric systemic and ocular diseases, clinical approach of geriatric patients, pharmacological aspects of ageing ,and spectacle dispensing aspects in ageing patients.

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.

TEXT BOOKS: A.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

PREREQUISITES: Ocular anatomy, Physiology, Ocular Disease

PEDIATRIC OPTOMETRY

INSTRUCTOR INCHARGE: Paediatric Ophthalmologist / Optometrist

COURSE DESCRIPTION: This course is designed to provide the students adequate knowledge in theoretical and practical aspects of diagnosis, and management of eye conditions related to paediatric population. Also it will inculcate the skill of transferring / communicating the medical information to the attender / patient by the students. The scope of this subject is to train the optometrists to develop a systematic way of dealing with children below 12, so as to implement primary eye care and have better, specialized management of anomalies.

COURSE OBJECTIVES: At the end of the course the student is expected to:

1. Have a knowledge of the principal theories of childhood development, and visual development
2. Have the ability to take a thorough paediatric history which encompasses the relevant developmental, visual, medical and educational issues
3. Be familiar with the accommodative-vergence system, the genesis of ametropia, the disorders of refraction, accommodation and vergence, and the assessment and management of these disorders
4. Be familiar with the aetiology, clinical presentation and treatment of amblyopia, comitant

strabismus and commonly presenting incomitant strabismus

5. Have a knowledge of the epidemiology of eye disease in children, the assessment techniques available for examining visual function of children of all ages and an understanding varied management concepts of paediatric vision disorders
6. Have knowledge of the art of dispensing contact lens, low vision aids and referral to the surgeon or other specialists at the appropriate timing.
7. Have a capacity for highly evolved communication and co-management with other professionals involved in paediatric assessment and care

TEXT BOOKS:

1. Pediatric Optometry - JEROME ROSNER, Butterworth, London 1982
2. Paediatric Optometry –William Harvey/ Bernard Gilmartin, Butterworth –Heinemann, 2004

REFERENCE BOOKS:

1. Binocular Vision and Ocular Motility - VON NOORDEN G K Burian Von Noorden's, 2nd Ed., C.V. Mosby Co. St. Louis, 1980.
2. Assessing Children's Vision. By Susan J Leat, Rosalyn H Shute, Carol A Westall.45 Oxford: Butterworth-Heinemann, 1999.
3. Clinical pediatric optometry. LJ Press, BD Moore, Butterworth- Heinemann, 1993

PREREQUISITES: Ocular anatomy, Physiology, Ocular Disease

Syllabus

Theory: 30 hours Credits 02

NO. OF UNITS	TOPICS	NO. OF HRS
I	1. Structural , and morphological changes of eye in elderly 2. Physiological changes in eye in the course of aging. 3. Introduction to geriatric medicine – epidemiology , need for optometry care, systemic diseases (Hypertension, Atherosclerosis, coronary heart disease, congestive Heart failure, Cerebrovascular disease, Diabetes, COPD)	**6**
II	4. Optometric Examination of the Older Adult 5. Ocular diseases common in old eye, with special reference to cataract, glaucoma, maculardisorders, vascular diseases of the eye 6. Contact lenses in elderly	**6**
III	7. Pharmacological aspects of aging 8. Low vision causes, management and rehabilitation in geriatrics. 9. Spectacle dispensing in elderly – Considerations of spectacle lenses and frames	**6**
	PEDIATRIC OPTOMETRY	

IV	1. The Development of Eye and Vision 2. History taking Paediatric subjects 3. Assessment of visual acuity 4. Normal appearance, pathology and structural anomalies of Orbit, Eye lids, Lacrimal system, Conjunctiva, Cornea, Sclera Anterior chamber, Uveal tract, Pupil Lens, vitreous, Fundus Oculomotor system 5. Refractive Examination 6. Determining binocular status 7. Determining sensory motor adaptability 8. Compensatory treatment and remedial therapy for : Myopia, Pseudomyopia, Hyperopia,Astigmatism, Anisometropia, Amblyopia 9. Remedial and Compensatory treatment of Strabismus and Nystagmus	**6**
V	10. Paediatric eye disorders : Cataract, Retinopathy of Prematurity, Retinoblastoma,Neuromuscular conditions (myotonic dystrophy, mitochondrial cytopathy), and Genetics 11. Anterior segment dysgenesis, Aniridia, Microphthalmos, Coloboma, Albinism 12. Spectacle dispensing for children 13. Paediatric contact lenses 14. Low vision assessment in children	**6**

BINOCULAR VISION I

INSTRUCTOR INCHARGE: Optometrists with B. Optom and experience in Binocular vision course teaching. Or M. Optom or specialised fellowship in Binocular vision optometry.

COURSE DESCRIPTION: This course provides theoretical aspects of Binocular Vision and its clinical application. It deals with basis of normal binocular vision and space perception, Gross anatomy and physiology of extraocular muscles, various binocular vision anomalies, its diagnostic approaches and management.

COURSE OBJECTIVES: On successful completion of this module, a student will be expected to be able to:-

1. Demonstrate an in-depth knowledge of the gross anatomy and physiology relating to the extraocular muscles.
2. Provide a detailed explanation of, and differentiate between the etiology, investigation and management of binocular vision anomalies.
3. Adapt skills and interpret clinical results following investigation of binocular vision anomalies appropriately and safely.

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. V. Mosby Company
4. Mitchell Scheiman; Bruce Wick: Clinical Management of Binocular VisionHeterophoric, Accommodative, and Eye Movement Disorders, 2008, Lippincot Williams & Wilkins publishers

PREREQUISITES: Ocular anatomy, Physiology

SYLLABUS
Theory :15 hours Credits 01

NO. OF UNITS	TOPICS	NO. OF HRS
I	1. Binocular Vision and Space perception. Relative subjective visual direction. Retino motor value Grades of BSV SMP and Cyclopean Eye Correspondence, Fusion, Diplopia, Retinal rivalry Horopter Physiological Diplopia and Suppression Stereopsis, Panum's area, BSV. Stereopsis and monocular clues - significance. Egocentric location, clinical applications.	**3**

	Theories of Binocular vision. 2. Anatomy of Extra Ocular Muscles. Rectii and Obliques, LPS. Innervation & Blood Supply.	
II	3. Physiology of Ocular movements. Center of rotation, Axes of Fick. Action of individual muscle. 4. Laws of ocular motility Donder's and Listing's law Sherrington's law Hering's law 5. Uniocular& Binocular movements - fixation, saccadic & pursuits. Version &Vergence. Fixation & field of fixation	**3**
III	6. Near Vision Complex Accommodation Definition and mechanism (process). Methods of measurement. Stimulus and innervation. Types of accommodation. Anomalies of accommodation – aetiology and management. 7. Convergence Definition and mechanism. Methods of measurement. Types and components of convergence - Tonic, accommodative, fusional, proximal. Anomalies of Convergence – aetiology and management.	**3**
IV	8. Sensory adaptations Confusion 9. Suppression Investigations Management Blind spot syndrome	**3**
V	10. Abnormal Retinal Correspondence Investigation and management Blind spot syndrome 11. Eccentric Fixation Investigation and management 12. Amblyopia Classsification Aeitiology Investigation Management	**3**

SYSTEMIC DISEASES

INSTRUCTOR INCHARGE: General Medicine professional

COURSE DESCRIPTION: This course deals with definition, classification, clinical diagnosis, complications and management of various systemic diseases. In indicated cases ocular manifestations also will be discussed.

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

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

SYLLABUS
Theory: 15hours Credit 1

NO. OF UNITS	TOPICS	NO. OF HRS
I	1. Hypertension Definition, classification, Epidemiology, clinical examination, complications, andmanagement. Hypertensive retinopathy 2. Diabetes Mellitus Classification, pathophysiology, clinical presentations, diagnosis, and management,Complications Diabetic Retinopathy 3. Thyroid Disease Physiology, testing for thyroid disease, Hyperthyroidism, Hypothroidism, Thyroiditis, Thyroid tumors Grave's Ophthalmopathy 4. Acquired Heart Disease Ischemic Heart Disease, Congestive heart failure, Disorders of cardiac rhythm Ophthalmic considerations	**3**
II	5. Cancer : Incidence Etiology Therapy	**3**

	Ophthalmologic considerations Connective Tissue Disease Rheumatic arthritis Systemic lupus erythematosus Scleroderma Polymyositis and dermatomyositis Sjogren syndrome Behcet's syndrome Eye and connective tissue disease 6. Tuberculosisetiology, pathology, clinicalfeatures, pulmonary tuberculosis, diagnosis,complications, treatment tuberculosis & the eye. 7. Herpes virus (Herepes simplex, Varicella Zoster, Cytomegalovirus, Epstein Barr Virus) Herpes and the eye	
III	8. Hepatitis (Hepatitis A, B, C) 9. Acquired Immunodeficiency Syndrome 10. Anemia (Diagnosis, clinical evaluation, consequences, Sickle cell disease, treatment,Ophthalmologic considerations) 11. Common Tropical Medical Ailments Malaria Typhoid Dengue Filariases Onchocerciasis Cysticercosis Leprosy	**3**
IV	12. Nutritional and Metabolic disorders: Obesity Hyperlipidaemias Kwashiorkor Vitamin A Deficiency Vitamin D Deficiency Vitamin E Deficiency Vitamin K Deficiency Vitamin B1,B2, Deficiency Vitamin C Deficiency 13. Myasthenia Gravis 14. First Aid General Medical Emergencies Preoperative precautions in ocular surgeries	**3**
V	15. Psychiatry Basic knowledge of psychiatric condition and Patient Management 16. Genetics Introduction to genetics Organisation of the cell Chromosome structure and cell division Gene structure and basic principles of Genetics. Genetic disorders and their diagnosis.	**3**

	Genes and the eye Genetic counseling and genetic engineering.	

CLINICAL OPTOMETRY IV

Total: 420 hours

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 diagnosticand 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 programs namely, school vision screening, glaucoma and diabetic retinopathy screening etc., Students also get hand-on practical sessions on the following courses namely, contact lens, low vision care, geriatric optometry and paediatric optometry.

SEMESTER – VI

CONTACT LENSES II

INSTRUCTOR INCHARGE : B.Optom or optometrists with higher qualification

COURSE DESCRIPTION: The subject provides the student with suitable knowledge both intheoretical and practical aspects of Contact Lenses.

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

TEXT BOOKS:

1. IACLE modules 1 - 10
2. CLAO Volumes 1, 2, 3
3. Anthony J. Phillips : Contact Lenses, 5thedition, 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

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

SYLLABUS
Theory: 30hours/Practical: 30hours
Credits Theory 02 Practical 1

NO. OF UNITS	TOPICS	NO. OF HRS
I	1. SCL Materials & Review of manufacturing techniques 2. Comparison of RGP vs. SCL 3. Pre-fitting considerations for SCL	**6**
II	4. Fitting philosophies for SCL 5. Fit assessment in Soft Contact Lenses: Types of fit – Steep, Flat, Optimum 6. Calculation and finalising SCL parameters Disposable lenses	**6**
III	1. Advantages and availability 2. Soft Toric CL Stabilization techniques Parameter selection	**6**

	Fitting assessment 3. Common Handling Instructions Insertion & Removal Techniques Do's and Dont's 4. Care and Maintenance of Soft lenses Cleaning agents & Importance Rinsing agents & Importance Disinfecting agents & importance Lubricating & Enzymatic cleaners	
IV	1. Follow up visit examination 2. Complications of Soft lenses 3. Therapeutic contact lenses Indications Fitting consideration	**6**
V	1. Specialty fitting Aphakia Pediatric Post refractive surgery 2. Management of Presbyopia with Contact lenses	**6**

PRACTICAL (Total: 30 hours)

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

BINOCULAR VISION II

INSTRUCTOR INCHARGE: Optometrists with B. Optom and experience in Binocular visioncourse teaching. Or M. Optom or specialised fellowship in Binocular vision optometry

COURSE DESCRIPTION: This course deals with understanding of strabismus, its classification, necessary orthoptic investigations, diagnosis and non-surgical management. Along with theoretical knowledge it teaches the clinical aspects and application.

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.

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

PREREQUISITES: Ocular Anatomy, Ocular Physiology, Binocular Vision –I.

SYLLABUS
Theory : 30hours/Practical :15 hours
Credits Theory 02 Practical 0.5

NO. OF UNITS	TOPICS	NO. OF HRS
I	1. Neuro-muscular anomalies 1.1 Classification and etiological factors 2. History – recording and significance.	**4**
II	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. Divergent Strabismus 4.1 Classification	**10**

	4.2 A& V phenomenon 4.3 Investigation and Management 5. Vertical strabismus 5.1 Classification 5.2 Investigation and Management	
III	6. Paralytic Strabismus 6.1 Acquired and Congenital 6.2 Clinical Characteristics 7. Distinction from comitant and restrictive Squint 8. Investigations 8.1 History and symptoms 8.2 Head Posture 8.3 Diplopia Charting 8.4 Hess chart 8.5 PBCT 8.6 Nine directions 8.7 Binocular field of vision	**6**
IV	9. Amblyopia and Treatment of Amblyopia 10. Nystagmus 11. Non-surgical Management of Squint 12. Restrictive Strabismus 12.1 Features 12.2 Musculo-fascical anomalies 12.3 Duane's Retraction syndrome 12.4 Clinical features and management 12.5 Brown's Superior oblique sheath syndrome 12.6 Strabismus fixus 12.7 Congenital muscle fibrosis	**6**
V	13. Surgical management	**4**

PRACTICAL (Total: 15 hours): Deals with hand-on session the basic binocular vision evaluation techniques.

PUBLIC HEALTH AND COMMUNITY OPTOMETRY

INSTRUCTOR INCHARGE: Public Health professional or optometrist with public health and community optometry experience

COURSE DESCRIPTION: Introduction to the foundation and basic sciences of public health optometry with an emphasis on the epidemiology of vision problems especially focused on Indianscenario.

COURSE OBJECTIVES: At the end of the course students will be be knowledgeable in thefollowing 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 programs in the community
5. Vision screening for various eye diseases in the community and for different age groups.

TEXT BOOKS:

1. GVS Murthy, S K Gupta, D Bachani: The principles and practice of community Ophthalmology, National program 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

PREREQUISITES: Ocular Disease, Visual optics, Optometric Instruments, Clinical Examination of Visual System

SYLLABUS
Theory: 15 hours Credit 01

NO. OF UNITS	TOPICS	NO. OF HRS
I	1. Public Health Optometry: Concepts and implementation, Stages of diseases 2. Dimensions, determinants and indicators of health 3. Levels of disease prevention and levels of health care patterns 4. Epidemiology of blindness – Defining blindness and visual impairment 5. Eye in primary health care	**3**
II	6. Contrasting between Clinical and community health programs 7. Community Eye Care Programs 8. Community based rehabilitation programs 9. Nutritional Blindness with reference to Vitamin A deficiency	**3**

	10. Vision 2020: The Right to Sight	
III	11. Screening for eye diseases 12. National and International health agencies, NPCB 13. Role of an optometrist in Public Health	**3**
IV	14. Organization and Management of Eye Care Programs – Service Delivery models 15. Health manpower and planning & Health Economics 16. Evaluation and assessment of health programs	**3**
V	1. Optometrists role in school eye health programs 2. Basics of Tele Optometry and its application in Public Health 3. Information, Education and Communication for Eye Care programs	**3**

OCCUPATIONAL OPTOMETRY

INSTRUCTOR INCHARGE: Occupational Health professional and /or Optometrist withexperience in occupational eye health

COURSE DESCRIPTION: This course deals with general aspects of occupational health, Visual demand in various job, task analysing method ,visual standards for various jobs , occupational hazards and remedial aspects through classroom sessions and field visit to the factories.

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

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.

TEXT BOOKS:

1. PP Santanam, R Krishnakumar, 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
4. G Carson, S Doshi, W Harvey: Eye Essentials: Environmental & Occupational Optometry, Butterworth-Heinemann, 2008

SYLLABUS
Theory: 15 hours Credit 01

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

RESEARCH PROJECT/DISSERTATION

Total: 30 hours Credit 01

Team of students will be doing a research project under the guidance of a supervisor (who could be optometrists/vision scientists/ ophthalmologist). Student will get the experience of doing a research in systematic approach – identifying the primary question, literature search, identifying the gaps in the literature, identifying the research question, writing up the research proposal, data collection, data analysis, thesis writing and presentation.

Project is spread through sixth to eighth semester.

CLINICAL OPTOMETRY V

Total: 375hrs.

The course is the final series of five directed clinical courses. The student will complete the clinical training by practicing all the skills learned in classroom and clinical instruction. Practical aspects of Binocular vision II, public health & community optometry, and occupational optometry will be covered under the studentship.

SEMESTER VII & VIII

The internship time period provides the students the opportunity to continue to develop confidenceand increased skill in diagnosis and management. Students will demonstrate competence in beginning, intermediate, and advanced procedures in above areas. Students will participate in advanced and specialized treatment procedures. The student will complete the clinical training bypracticing all the skills learned in classroom and clinical instruction. The students are expected towork for minimum 6 hours per day and this may be more depending on the need and the healthcaresetting.

During these semesters students also will continue the research work allotted during the sixth semester and submit the final report and make presentation in front of the experts.

Internships postings can be in the following locations: Eye Hospitals, Eye clinics in general hospital, Independent eye clinics, Optometric clinics in eye hospitals, general hospitals or optical showrooms, optical showrooms and other relevant locations wherein the learning objective can be achieved. Short period of training to eye care (instruments, optical, contact lens) related manufacturing set- ups, corporates and nongovernmental organisations.