REGULATIONS AND CURRICULUM GOVERNING

BACHELOR OF OPTOMETRY PROGRAM

Implemented in Academic Year 2017-18

Revised in 2022

Amended up to 2025

Name of the Constituent Unit: Yenepoya School of Allied Health Sciences

RABBI ZIDNI 'ILMA

YENEPOYA

(DEEMED TO BE UNIVERSITY)

Derlakatte, Mangalore, Karnataka.

YENEPOYA
(DEEMED TO BE UNIVERSITY)

NOTIFICATION FROM THE UNIVERSITY

Sl. No.	ACM with date	Decisions/Approvals
	25 & 26 ACM / 20.01.2017	The B. Optometry programme was initiated.
	32 ACM / 03.09.2018	The undergraduate seat intake was increased from 10 to 20.
	37 ACM / 28.02.2020	The FAHP programme was introduced.
	38 ACM / 14.05.2020	Choice-Based Semester System (CBSS) was implemented in the B. Optometry programme.
	39 ACM / 09.09.2020	Relocation of existing and proposed courses was carried out as per institutional requirements.
	41 ACM / 22.02.2021	Grace marks were introduced in the Semester End Examination (SEE).
	42 ACM / 13.04.2021	The nomenclature was revised to B.Sc. Clinical Optometry / Bachelor of Optometry and B.Sc. Tech Optometry..
	44 ACM / 26.10.2021	CBSS was extended to all undergraduate programmes.
	47 ACM / 20.07.2022	A new open elective undergraduate programme was introduced.
	48 ACM / 05.11.2022	The B. Optometry seat intake was increased from 20 to 30.
	50 ACM / 16.02.2023	Foreign language courses were introduced as

Sl. No.	ACM with date	Decisions/Approvals
		open electives.
	51 ACM / 16.05.2023	New multidisciplinary elective courses were introduced at the undergraduate level
	51 ACM / 16.05.2023	The National Credit Framework (NCRF) was implemented.
	54 ACM / 01.01.2024	The number of undergraduate seats was further increased from 30 to 40.
	61 ACM / 12.03.2025	Changes were implemented in the Pathology and Microbiology syllabus for the second semester.

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1. Preamble

Health care sector has become one of the largest employment generation sectors in India and abroad. Rapidly changing and expanding horizon of the health care sector demands formal training programs in all its allied areas. Advanced complex instrumentation & equipment require technologists not only to operate but also to care & maintain these instruments and equipment. These technologists should possess a strong scientific foundation to be able to perform these tasks at a much higher level than the traditionally trained technicians of the past used to perform. The students who are trained in the technological aspects of medical care with a good scientific foundation will be in a position to competently assist the Physician or Surgeon. Hence to prepare the students to meet the demands of the healthcare sector and in accordance with Ministry of Human Resource Development (HRD), Govt. of India education system introduced National higher education quality framework (NHEQF), the program is designed in a way the curriculum is student centric having flexible choice based credit system with value based holistic multidisciplinary approach.

B.Optom is an undergraduate program in the field of health care concerned with the examination, diagnosis and management of the disorders of the optical system of the eye.Optometrists play an important multidimensional role in the functioning of eye clinics and hospitals. The program is envisaged to develop a multipurpose paramedical ophthalmic manpower competent in providing service as an Optician, Optometrist, refractionist and Ophthalmic Assistant to the community in urban, semi-urban and rural settings in private, semi- Governmental and Governmental sectors.

- They test for refractive errors, prescribe and dispense optical corrections and low vision aids;
- They assist in the diagnosis and management of disorders of binocular vision;
- They assist the ophthalmologist in managing various ocular disease in the out-patient, in-patient departments
- They assist in conduct of community eye health programs.

The importance of optometrists has been increasing steadily owing to the rapid advances in instrumentation in the diagnosis and management of ophthalmological conditions. In India, the high prevalence of ocular conditions like cataract, glaucoma, refractive errors and

diabetic retinopathy require a pro-active community approach in alignment with the National Program for Control of Blindness.

Several institutes in India, conduct certificate programs, diploma, graduate and post-graduate programs in optometry. These programs are regulated by Universities and paramedical boards. Whereas, the certificate and diploma programs offer training at the basic level, both theoretical and practical, the graduate and post-graduate degrees have advanced training of the students in all aspects of optometry.

2. Definitions

2.1 Academic Year: Two consecutive (one odd + one even) semesters constitute one academic year.

2.2 Semester System / Choice Based Credit System: The semester system accelerates the teaching – learning process. The CBCS provides flexibility in designing curriculum and assigning credits based on the course content and hours of teaching. The choice based credit system provides a cafeteria type approach in which the students can take courses of their choice, undergo additional courses and acquire more than the required credits, and adopt an interdisciplinary approach to learning

An academic year shall consist of two semesters:

Odd Semester 1st, 3rd, 5th& 7th	September/October to February/March
Even semester 2nd, 4th, 6th& 8th	March/April to August/September

2.3 Course: Usually referred to, as "papers" is a component of a programme. The courses shall define learning objectives and learning outcomes. A course shall comprise lectures/ tutorials/ laboratory work/ field work/ outreach activities/ project work/ vocational training/viva/ seminars/ term papers/assignments/ presentations/ self-study etc. or a combination of some of these. The courses can be of the following types i.e. Core, Ability Enhancement, Skill enhancement, Value added courses, Multidisciplinary Electives and Internship.

2.4 Credits: Credit defines the quantum of contents/syllabus prescribed for a course and determines the number of hours of instruction required per week. Thus, normally in each of the courses, credits will be assigned on the basis of the number of lectures/tutorial laboratory work and other forms of learning required, to complete the course contents in a 15-20week schedule: One credit =1 hour of lecture per week/ two hours of Laboratory or practical/three hours of clinical rotation, field work/posting. All courses need not carry the same credits.

	Lecture (L)	Tutorial (T)	Practical (P)	Clinical Rotation (CR)
1 Credit	1 Hour	1 Hour	2 Hours	3-5 Hours

Credit Hours for different types of courses: Each course may have only a lecture component or a lecture and tutorial component or a lecture and practicum component or a lecture, tutorial, and practicum component, or only practicum component. For example, a three-credit lecture course in a semester means three one-hour lectures per week with each one-hour lecture counted as one credit. In a semester of 15 weeks duration, a three-credit lecture course is equivalent to 45 hours of teaching.

One credit for tutorial work means one hour of engagement per week. In a semester of 15 weeks duration, a one-credit tutorial in a course is equivalent to 15 hours of engagement.

A one-credit course in practicum or lab work, community engagement and services, and fieldwork in a semester mean two-hour engagement per week. In a semester of 15 weeks duration, a one-credit practicum in a course is equivalent to 30 hours of engagement.

A one-credit of Seminar or Internship or Studio activities or Field practice/projects or Community engagement and service means two-hour engagements per week. Accordingly, in a semester of 15 weeks duration, one credit in these courses is equivalent to 30 hours of engagement.

A course can have a combination of lecture credits, tutorial credits, and practicum credits. For example, a 4–credit course with three credits assigned for lectures and one credit for practicum shall have three 1-hour lectures per week and one 2-hour duration field-based learning/project or lab work, or workshop activities. In a semester of 15 weeks duration, a 4-credit course is equivalent to 45 hours of lectures and 30 hours of practicum. Similarly, a 4 –credit course with 3- credits assigned for lectures and one credit for tutorial shall have three 1-hour lectures per week and one 1-hour tutorial per week. In a semester of 15 weeks duration, a four-credit course is equivalent to 45 hours of lectures and 15 hours of tutorials.

Experiential learning credit is equal to 3-hour duration per week. For example, 1 credit for experiential learning will mean 45 hours of learning. The credits assigned to the course is indicated as L:T:P format. For example, for a 4credit course format could be: 4:0:0 or 1:2:1 or 3:1:0 or 0:0:4etc.

2.5 **Programme:** An educational program leading to award of a degree, diploma or certificate. The following types of courses/activities constitute the programmes of study. Each of them will require a specific number of hours of teaching/guidance and laboratory/studio/workshop activities, field-based learning/projects, internships, and community engagement and service.

a. **Lecture courses:** Courses involving lectures relating to a field or discipline by an expert or qualified personnel in a field of learning, work/vocation, or professional practice.

b. **Tutorial courses:** Courses involving problem-solving and discussions relating to a field or discipline under the guidance of qualified personnel in a field of learning, work/vocation, or professional practice.

c. **Practicum or Laboratory work:** A course requiring students to participate in a project or practical or lab activity that applies previously learned/studied principles/theory related to the chosen field of learning, work/vocation, or professional practice under the supervision of an expert or qualified individual in the field of learning, work/vocation or professional practice.

d. **Seminar:** A course requiring students to participate in structured discussion/conversation or debate focused on assigned tasks/readings, current or historical events, or shared experiences guided or led by an expert or qualified personnel in a field of learning, work/vocation, or professional practice.

e. **Internship:** A course requiring students to participate in a professional activity or work experience, or cooperative education activity with an entity external to the education institution, normally under the supervision of an expert of the given external entity. A key aspect of the internship is induction into actual work situations. Internships involve working with local industry, government or private organizations, business organizations, artists,

crafts persons, and similar entities to provide opportunities for students to actively engage in on-site experiential learning.

f. **Studio activities:** Studio activities involve the engagement of students in creative or artistic activities. Every student is engaged in performing a creative activity to obtain a specific outcome. Studio-based activities involve visual- or aesthetic focused experiential work.

g. **Field practice/projects:** Courses requiring students to participate in field-based learning/projects generally under the supervision of an expert of the given external entity.

h. **Community engagement and service:** Courses requiring students to participate in field-based learning/projects generally under the supervision of an expert of the given external entity. The curricular component of 'community engagement and service' will involve activities that would expose students to the socio-economic issues in society so that the theoretical learnings can be supplemented by actual life experiences to generate solutions to real-life problems.

i. **Experiential learning activities:** Field project work / Day out learning activities etc are considered as experiential activities.

2.6 Grade Point: It is a numerical weight allotted to each letter grade on a 10-point scale.

2.7 Credit Point: It is the product of grade point and number of credits for a course.

2.8 Letter Grade: It is an index of the performance of students in a said course. Grades are denoted by letters: O, A+, A, B+, B, C, P, F, AB.

2.9 Cumulative Grade Point Average (CGPA): It is a measure of overall cumulative performance of a student over all semesters. The CGPA is the ratio of total credit points secured

by a student in various courses in all semesters and the sum of the total credits of all courses in all the semesters. It is expressed up to two decimal places.

2.10 Semester Grade Point Average (SGPA): It is a measure of performance of work done in a semester. It is ratio of total credit points secured by a student in various courses registered in a semester and the total course credits taken during that semester. It shall be expressed up to two decimal places.

2.11 Transcript or Grade Card or Certificate: Based on the grades earned, a grade certificate shall be issued to all the registered students after every semester. The grade certificate will display the course details (code, title, number of credits, grade secured) along with SGPA of that semester.

2.12 Academic Bank Account: Means an individual account with the Academic Bank of Credits opened and operated by a student, to which all academic credits earned by the student from course(s) of study are deposited, recognized, maintained, accumulated, transferred, validated or redeemed for the purposes of the award of degree/diploma/certificates etc. by an awarding institution.

2.13 Academic Bank of Credits: Means the provision for innovative and interchangeable curricular structures to enable creative combinations of Courses or Programmes in Disciplines of study leading to Degree or Diploma or Post Graduate Diploma or Certificate of Study offering multiple entry and multiple exit facilities, while removing rigid curricular boundaries and creating new possibilities of life-long learning.

2.14 Credit Accumulation: Means the facility created by Academic Bank of Credits in the Academic Bank Account opened by students in order to transfer and consolidate the credits earned by them by undergoing Courses.

2.15 Credit Redemption: Means the process of commuting the accrued credits in the Academic Bank Account of the students maintained in ABC for the purpose of fulfilling the credits requirements for the award of Degrees or Diplomas or Certificates or Course work

for Ph.D. programme etc., by the registered degree-awarding Higher Educational Institutions.

2.16 Credit Transfer: Means the mechanism by which the Registered Higher Educational Institutions are able to receive or provide prescribed credits to individual Academic Bank Accounts in adherence to the University Grants Commission credit norms for the 'course/s' undertaken by students enrolled in any Registered Higher Education Institution within India.

2.17 Curricular components of the B.Sc. Respiratory Therapy Programme:

Courses in the programme may be of the following types:

a. Core Course
b. Skill Enhancement Courses (SEC)
c. Ability Enhancement Courses (AEC)
d. Value Added Courses (VAC)
e. Multidisciplinary Elective (ME)
f. Internship

a. Core Course (CC): A course, which should compulsorily be studied by a candidate as a core requirement is termed as a Core course. This is the course which is the major disciple/subject having main focus and degree will be awarded in this discipline. This core course provides opportunity for our student to pursue in depth study of a particular subject or discipline hence, it is compulsorily studied by a student as a core requirement to complete the program of study in a said discipline. Every Core course shall be restricted to a minimum of 4 credits.

b. Skill Enhancement Course (SEC): SEC courses are aimed at imparting practical skills, hands- on training, competencies etc to enhance the skill-based knowledge and thus the employability of the students.

c. Ability Enhancement Courses (AEC): These are the courses which aim to provide the students the competency in a modern Indian language (MIL) and in the English language with special emphasis on language and the communication skills. The courses aim

at enabling the students to acquire and demonstrate the core linguistic skills, including critical reading and expository and academic skills, that helps students articulate their arguments and present their thinking clearly and coherently and recognize the importance of language as a mediator of knowledge and identity. The courses will also emphasize the development and enhancement of skills such a communication, and the ability to participate/ conduct discussion and debate.

d. Value Added Courses (VAC): These are the courses relating to understanding India, environmental science/ education, Health and Wellness etc..

i. **Constitution of India:** The course aims at enabling the students at acquire and demonstrate the knowledge and understanding of contemporary India with its historical perspective, the basic framework of the goals and policies of National development, and the constitutional obligations with special emphasis on constitutional values and fundamental rights and duties.

ii. **Environmental Studies:** The course aims to equip the students with the ability to apply the acquired knowledge, skills, attitudes, and values require to take appropriate actions for mitigating the effects of environmental degradation, climate change, and pollution, effective waste management, conservation of biological diversity, management of biological resources, forest and wild life conservation, and sustainable development and living.

iii. **Human Rights & Gender equity:** TheCourse emphasis understanding social justice issues and roles of human rights in promoting equitable society including international, national perspective, contemporary issues with this holistic coverage and relevance to today's world.

iv. **Medical Ethics:** The course deals with ethics involving fundamental and moral issues related to decision making while performing professional practice. It guides the students in systematic and rational way of working through dilemmas and to determine the best course of action in their field of practice.

e. **Multidisciplinary Electives (ME):** These courses are intended to broaden the intellectual experience and form part of liberal arts and science education. Students are not allowed to choose or repeat courses already undergone at the higher secondary level (Twelfth class). The courses relating to any of the broad discipline given below will come under this category.

i. **Natural and Physical Sciences:** Students can choose basic courses from disciplines such as natural science, for example, Biology, Botany, Zoology, Biotechnology, Biochemistry, Chemistry, Physics, Biophysics, Astronomy and Astrophysics, Earth and Environmental sciences, etc.

ii. **Mathematics, Statistics and computer applications:** Courses under this category will facilitate the students to use and apply tools and techniques in their major and minor disciplines. The course may include training in programming software like python among others and application software like STATA, SPSS, TALLY, etc. Basic courses under this category will be helpful; for science and social science in data analysis and the application of quantitative tools.

iii. **Library, Information, and Media Sciences:** Courses from this category will help the students to understand the recent developments in information and media science (journalism, Mass Media, and Communication)

iv. **Commerce and Management:** Courses include business management, accountancy, financial institutions, Fintech, etc.,

v. **Humanities and Social Sciences:** The courses relating to Social sciences, for example, Anthropology, Communication and Media, Economics, History, Linguistics, Political science, Psychology, Social work, Sociology, etc. will enable students to understand the individuals and their social behavior, society and nation. Students be introduced to survey methodology and available large – scale databases for India. The courses under humanities include for example, Archeology, History, Comparative Literature, Arts and Creative Expressions, Creative writing and literature, language(s), philosophy etc., and interdisciplinary courses relating to humanities. The list of courses that can include

interdisciplinary subjects such as cognitive science, environmental science, gender studies, global environment and health, international relations, political economy and development, sustainable development, Women's and gender studies, etc. will be useful to understand society.

The Multidisciplinary elective offered by Yenepoya (Deemed to be) University includes:

i. **First Aid and Basic Life Support (BLS):** ThisCourse deals with training the students to be a first responder when there are medical or traumatic emergencies.

ii. **Yoga:** The coursedevelop a comprehensive understanding of yoga, including its history, various schools, practices, and their application in daily life, while also recognizing its potential for personal well-being, professional growth, and promoting positive health.

iii. **Vermitechnology:** This category of course will help students to gain skills in using worms to convert decomposing food waste into nutrient-rich fertilizer in simple, inexpensive and energy efficient way.

iv. **Positive Psychology:** The course will enable students to enrich themselves to thrive on the belief that people want to lead meaningful and fulfilling lives, cultivate what is best within them, and enhance their experiences of love, work, and play.

v. **National Service Scheme (NSS):**Students can choose NSS to understand the basic concept of NSS, to identify the needs and problems of the community in which they work and to gain skills in mobilizing community participation.

vi. **Lifestyle Management:** This course will help students to learn to achieve health goals through lifestyle and behavior adjustments by creating healthy habits as well as stress management.

vii. **Youth Red Cross:** The course deals withproviding knowledge on Youth Red Cross volunteer ship and identifying the role of youth in humanitarian service. It also enables youth to promote national and international understanding by using

international link of the movement.

viii. **Jeevan Kaushal:**University grant commission identified 4 modules on life skills (Jeevan Kaushal), the skills that required through our life. Jeevan Kaushal courses such as Communication skills, Professional Skills, Leadership and Management skills and Universal Human Values which will help students in developing personal competencies that helps to deal with challenges of life effectively thereby realizing his/her infinite potential as a human being.

ix. **Self – learning course:** In accordance with the UGC (Credit Framework for Online Learning Courses through SWAYAM) Regulation, 2021, New Delhi, dated 25th March 2021, and reference No.F.1-100/2016 (MOOCs/e-content), students are encouraged to augment their learning experience by opting for Massive Open Online Courses (MOOCs), Study Webs of Active Learning for Young Aspiring Minds (SWAYAM), and Coursera courses as part of the multidisciplinary elective.

Yenepoya (Demed to be University) will adhere to UGC regulations governing MOOCs/SWAYAM/Coursera courses, incorporating amendments as communicated by UGC over time. To facilitate the seamless completion of chosen courses, the department will appoint a designated course coordinator. The coordinator will guide and support students throughout the duration of the selected online courses.

The evaluation process will adhere to predefined norms and parameters, which will be communicated in the course overview at the time of offering.

In COURSERSA, the assessment are multifaceted and include quizzes or tests at the conclusion of each module, assignments or projects demonstrating the practical application of concepts, active participation in discussion forums, and peer-reviewed assessments. The culmination of each course involves final quizzes or capstone projects tailored to the course's content. Upon successful completion, students receive an online certificate, Yenepoya (Deemed to be University) will integrate the acquired credits into the student's official marks sheet.

In SWAYAM, Assessment will include formative continuous online assessments and end-of-course proctored exams, all of which are mandatory for successful completion by the student. Yenepoya (Deemed to be University) will integrate the marks or grade achieved by the student, conveyed by the Host Institution through the PI of the SWAYAM course, into the student's official marks sheet. These marks contribute to the final award of the degree conferred by the University.

f. Internship

The internship time period provides the candidate the opportunity to develop confidence and increased skill in simulation and treatment delivery. Candidate will demonstrate competence in basic and intermediate procedures and will observe the advanced and specialized treatment procedures. The candidate will complete the clinical training by practicing all the skills learned in classroom and clinical instruction. The candidate is expected to work for minimum 8 hours per day and this may be more depending on the need and the healthcare setting.

3. Eligibility for Admissions:

To be eligible for admission in Bachelor of Optometry, a candidate should have passed two-years Pre University examination/ Pre Degree examination/ two years after ten years of schooling or its equivalent as recognized by the Yenepoya (Deemed to be) University with Physics, Chemistry and Biology as principal courses of study.

Candidate needs to secure 40% or above marks in the qualifying examination to be eligible for admission. For SC/ST/OBC candidates minimum marks required in the qualifying exam is 35% marks.

4. Duration of the Programme:

The duration of the programme shall extend over 8 semesters (three academic years with one year internship) each semester comprising minimum of 15 weeks with the minimum of 90 actual working days of instruction in each semester. The successful completion of the Undergraduate program, along with internship as applicable will lead to Bachelor's degree in Optometry (B.Optom).

5. Maximum Period for Completion of Programme:

A candidate shall complete six semesters (Three Years) programme within Six years from the date of admission. Hence, the maximum period for completion of the programme is seven years.

6. Aim of the Program

To prepare competent entry-level optometry professionals with comprehensive scientific knowledge in ocular and visual sciences, capable of safely assessing, diagnosing, and managing refractive, binocular vision, and ocular health conditions across primary, community, and clinical settings; while demonstrating ethical practice, effective communication, clinical reasoning, and collaborative functioning within multidisciplinary healthcare teams, along with a commitment to lifelong learning, evidence-based practice, and community-oriented eye-health promotion.

7. Outcomes of the Program

Program Outcome (PO): (Knowledge – K, Skill – S, Attitude – A, Communication – C)

Upon successful completion of the undergraduate course, students will have developed a broad knowledge in the field of evaluation, diagnosis and management of different conditions of the Ophthalmic system.

In particular they will be:

PO 1: Able to Practice Independently (K, S, A,C)

PO 2: Able to Perform Detailed evaluation of refractive errors (K, S,C)

PO 3: Able to provide Prescription of optical corrections including spectacles, contact lenses and prisms (K, S, A,C)

PO 4: Able to Diagnose common ocular disorders and their management (K, S)

PO 5: Able to know Application, use and maintenance of common ophthalmic equipment, instruments and lenses.(K, S)

PO 6: Able to perform Diagnosis and orthoptic management of common disorders of binocular vision (K, S,C)

PO 7: Able to Perform Counseling of patients for common ophthalmic conditions (S, A, C)

Expected skill to be acquired by the end of the programme:

PO 8: Skill in diagnosis, treatment planning and management of visual defects & impairments and in supporting the managements of ocular conditions. (K, S)

PO 9: Work independently or in concurrence with eye care and other health care professionals (S, A, C)

PO 10: To effectively participate in implementation of national health programs and other public health projects. (A, C)

Program Structure:

	Broad category of course	Hours / Credits	Course (Title)
1.	**Discipline-Specific Courses**		
a)	Theory	**I Semester**	
		60 Hours / 4 Credits	Human Anatomy & Physiology I
		60 Hours / 4 Credits	Pathology & Microbiology I
		60 Hours / 4 Credits	Physical Optics
		II Semester	
		60 Hours / 4 Credits	Human Anatomy & Physiology II
		60 Hours / 4 Credits	Pathology & Microbiology II
		60 Hours / 4 Credits	Biochemistry
		60 Hours / 4 Credits	Geometrical Optics
		III Semester	
		60 Hours / 4 Credits	Ocular Pathology & Microbiology
		60 Hours / 4 Credits	General Pharmacology
		60 Hours / 4 Credits	Ocular Pharmacology
		60 Hours / 4 Credits	Ocular Anatomy & Physiology
		60 Hours / 4 Credits	Optometric Instruments
		IV Semester	
		60 Hours / 4 Credits	Optometric & Dispensing Optics
		60 Hours / 4 Credits	Visual Optics
		60 Hours / 4 Credits	Ocular Disease I
		V Semester	
		60 Hours / 4 Credits	Contact Lens I
		60 Hours / 4 Credits	Binocular Vision I
		60 Hours / 4 Credits	Ocular Disease II
		60 Hours / 4 Credits	Community and Occupational Optometry

		VI Semester	
		60 Hours / 4 Credits	Contact Lens II
		60 Hours / 4 Credits	Binocular Vision II
		60 Hours / 4 Credits	Low Vision
b)		60 Hours / 4 Credits	Paediatric & Geriatric Optometry
c)	Practical (SEC)*	**III Semester**	
		120 Hours / 4 Credits	Clinical Optometry I
		IV Semester	
		120 Hours / 4 Credits	Clinical Optometry II
		V Semester	
		120 Hours / 4 Credits	Clinical Optometry III
		VI Semester	
		120 Hours / 4 Credits	Clinical Optometry IV
d)	Clinical (SEC)	-	-
e)	Simulation-based (SEC)*	-	-
2.	**Curriculum Enrichment Courses**		
a)	Field Visit	-	-
b)	Community Posting	-	-
c)	Industry / Clinical Internship	**VII Semester**	
		42 Hours/week / 20 Credits	Internship I
		VIII Semester	
		42 Hours/week / 20 Credits	Internship II
d)	Research Project	-	-
3.	**Electives**		
a)	Discipline-Specific Electives	-	-
b)	Interdisciplinary	45 Hours / 3 Credits	Coursera/Swayam/NSS/Red cross

	Courses	per year	
c)	Ability Enhancement Courses • *Soft skills development* • *Language and communication skill development* • *Analytical skill development* • *Personality and professional development* • *Employability skill development*	**I Semester**	
		45 Hours / 3 Credits	English and Communication I
		II Semester	
		45 Hours / 3 Credits	English and Communication II
		30 Hours / 2 Credits	Kannada
d)	Value Added Courses	**II Semester**	
		30 Hours / 2 Credits	Constitution of India
		III Semester	
		30 Hours / 2 Credits	Human Rights & Gender Equity
		IV Semester	
		30 Hours / 2 Credits	Environmental Science
		V Semester	
		30 Hours / 2 Credits	Biostatistics
		VI Semester	
		30 Hours / 2 Credits	Medical Ethics
	Total	**171 Credits**	

8. Attendance:

- Each course (theory, practical, clinical etc.) shall be treated as an independent unit for the purpose of attendance. Candidates having minimum 80% attendance in each of the Courses can only qualify to appear for the Semester End Examination. The Candidates with less than 80% of attendance shall be required to repeat that Course by attending the semester.
- There shall be no provision for condonation of shortage of attendance.
- The HOD/Programme Coordinator through the Dean of Faculties shall announce the names of the candidates who will not be eligible to take the Semester End- Examinations (SEE) in the various courses and send a copy of the same to the Controller of Examinations (COE) Office. Registrations of such candidates for those courses shall be treated as cancelled.

9. Teaching-Learning Methods Course wise:

Teaching - Learning method	**Courses**
Experiential learning	Contact Lens I & II Optometric Instruments Community & Occupational Optometry Low Vision Paediatric & Geriatric Optometry
Integrated/Inter-disciplinary learning	Ocular Anatomy & Physiology Ocular Pathology & Microbiology General Pharmacology Ocular Pharmacology Community & Occupational Optometry Low Vision Paediatric & Geriatric Optometry
Participatory learning	Binocular Vision I & II Contact Lens I & II Ocular Disease I & II

	Community & Occupational Optometry
Problem-solving methodologies	Physical Optics Geometrical Optics Optometric Instruments Visual Optics Binocular Vision I & II Contact Lens I & II Ocular Disease I & II Low Vision
Self-directed learning	Physical Optics Geometrical Optics Visual Optics Ocular Pharmacology Optometric & Dispensing Optics
Patient-centric learning	Contact Lens I & II Ocular Disease I & II Low Vision Binocular Vision I & II Community & Occupational Optometry Paediatric & Geriatric Optometry
Evidence-based learning	Ocular Disease I & II Binocular Vision I & II Contact Lens I & II Low Vision Community & Occupational Optometry Paediatric & Geriatric Optometry
The Humanities	Human Rights & Gender Equity Medical Ethics Constitution of India
Project-based learning	Contact Lens I & II Low Vision Community & Occupational Optometry

	Ocular Disease I & II
Role-play	Binocular Vision I & II Contact Lens I & II Community & Occupational Optometry Paediatric & Geriatric Optometry
Team-work	Optometric Instruments Contact Lens I & II Ocular Disease I & II Binocular Vision I & II Community & Occupational Optometry Low Vision
Reflective writing	Community & Occupational Optometry Low Vision
Any other (Simulation-Based Learning)	Optometric Instruments Contact Lens I & II Ocular Disease I & II Binocular Vision I & II Community & Occupational Optometry Low Vision

10.Scheme of Examination

Evaluation of a course shall be done based on continuous internal assessment (CIA) mode followed by Semester End University Examination (SEE) for each core, SEC, AEC & VAC. The evaluation of Multidisciplinary elective offered by Yenepoya (Deemed to be) University shall be done based on formative assessment.

The components of CIA (Continuous Internal Assessment) may include sessional tests, Seminar, Assignment/ Social involvement and other activities as determined by the respective speciality.

There shall be examinations at the end of each semester ordinarily during February/March for odd semesters and during August/September for even semesters.

The SEE duration shall be 60 minutes for 25 marks paper and 120 minutes for 50 marks paper.

The various Formative assessment method include Assignments, reports, quizzes..

10.1 Examination Structure

The examination structure shall vary dep ending on the course, however, broadly divided as follows:

Examination / Assessment	**Core / SEC**	**AEC (English, Kannada) / VAC**
Continuous Internal Assessment	50 Marks	25 Marks
Semester End Examination	50 Marks	25 Marks
Total	100Marks	50 Marks

10.2 Multidisciplinary Elective:

Multidisciplinary elective will be assessed through continuous and comprehensive assessment throughout the Semester (50 Marks)

i. Evaluation and Certification of online courses:

Evaluation will be based on predefined norms and parameters and announced in the overview of the Course at the time of offering the course. Formative continuous online assessments and end of course proctored exams shall be completed by the student.

The certificate obtained shall be submitted to the college office which will be communicated to the office of the Controller of Examinations of Yenepoya (Deemed to be University).

The Yenepoya (Deemed to be) University will give the equivalent credit weightage to the students for the credits earned through online learning courses through MOOCS/Coursera as per the credit plan of the program.

ii. Credit Mobility of Online Courses:

The Yenepoya (Deemed to be University) will give the equivalent credit weightage to the students for the credits earned through online learning courses as per the credit plan of the program.

In case a student fails to complete the online course he/ she may be allowed to complete the course requirements by registering for another online course in subsequent semester or opt for a course offered at this Yenepoya (Deemed to be University).

The elective course offered by the Yenepoya (Deemed to be University) shall be restricted to a maximum of 3 credits.

A candidate shall compulsorily complete total 9 Credits of Multidisciplinary courses.

These courses shall be selected either from the Generic Electives offered by the Yenepoya (Deemed to be) university or from the SWAYAM/Coursera courses. A Candidate shall have freedom to choose the courses of once own choice and learn at their own pace but, require to complete minimum 3 credits before second semester, 6 credits before fourth semester and 9 credits before sixth semester end examination.

A candidate who is desirous to add more credits shall be permitted to do so during the academic duration. Extra credits earned by a candidate shall be included in the marks card on submission of course completion certificate. However, it shall not be considered for awarding the Grade in the UG programme.

10.3 Parameters for Continuous Internal Assessment (CIA)

Internal Assessment Components	Core / SEC	AEC (English, Kannada) / VAC
Internal Assessment tests	20	10
Assignment	10	05
Continuous and comprehensive assessment	20	10
Total Marks	**50**	**25**

Assessment Methods:

1	Quiz	6	Role Play
2	Group Discussion	7	Peer to Peer Assessment
3	Open Book Exam	8	Mind Mapping
4	Think-Pair-Share	9	Minute paper
5	Presentations	10	Case Study

10.4 Question Paper Pattern for Core course (Internal Assessment & Semester End Examination)

	MAXIMUM MARKS = 50				**Duration**
Type of question	**Number of questions**	**To be Answered**	**Marks for each question**	**Total**	120 minutes
LONG ESSAY TYPE	02	01	10	10	
SHORT ESSAY TYPE	07	05	04	20	
SHORT ANSWERS	12	10	02	20	
			Total	**50**	

	MAXIMUM MARKS = 50				**Duration**
PART A					
Type of question	**Number of questions**	**To be Answered**	**Marks for each question**	**Total**	120 Minutes
LONG ESSAY TYPE	02	01	10	10	
SHORT ESSAY TYPE	02	01	05	05	

SHORT ANSWERS	06	05	02	10	
PART B					
LONG ESSAY TYPE	02	01	10	10	
SHORT ESSAY TYPE	02	01	05	05	
SHORT ANSWERS	06	05	02	10	
			Total	**50**	

10.5 Question Paper Pattern for Ability Enhancement Compulsory (AEC) Course

	MAXIMUM MARKS = 25				**Duration**
Type of question	**Number of questions**	**To be Answered**	**Marks for each question**	**Total**	
ESSAY	05	03	05	15	60 minutes
SHORT ANSWERS	07	05	02	10	
			Total	**25**	

10.6 Question Paper Pattern for Value Added (VAC) Course

	SUBJECTS HAVING MAXIMUM MARKS = 25				**Duration**
Type of question	**Number of questions**	**To be Answered**	**Marks for each question**	**Total**	
ESSAY	05	03	05	15	60 minutes
SHORT ANSWERS	07	05	02	10	
			Total	**25**	

10.7 Practical examination (SEC)

SI.NO	Components	Marks
1	Spotters	10
2	Case scenario/Stations	20
3	Viva Voce	20
Total Marks		50

Particulars of Practical, Viva-Voce

Practical examination will be aimed at examination of clinical skills and competence of the candidates for undertaking independent work as a specialist.

Viva- Voce examination shall aim at assessing depth of knowledge, logical reasoning, confidence &oral communication skills.

OSCE/OSPE- shall have minimum of 4 stations.

11. Eligibility to appear for University Examination

Each course (theory, practical, clinical etc.) shall be treated as an independent unit for the purpose of attendance. Candidates having minimum 80% attendance in each of the Courses can only qualify to appear for the Semester End Examination. The Candidates with less than 80% of attendance shall be required to repeat that Course by attending the semester.

There shall be no provision for condonation of shortage of attendance.

Evaluation of a course shall be done based on continuous internal assessment (CIA) mode followed by Semester End University Examination (SEE) for each core, SEC, AEC & VAC. The evaluation of Multidisciplinary elective offered by Yenepoya (Deemed to be) University shall be done based on formative assessment.

The components of CIA (Continuous Internal Assessment) may include sessional tests, Seminar, Assignment/ Social involvement and other activities as determined by the respective speciality.

The marks for CIA shall be 50% and SEE shall be 50%.

The minimum marks for CIA shall be 40% and SEE shall be 40% for a pass, but the minimum marks for pass per course shall be 50% CIA and SEE added together.

The HOD/Programme Coordinator through the Dean of Faculties shall announce the names of the candidates who will not be eligible to take the Semester End- Examinations (SEE) in the various courses and send a copy of the same to the Controller of Examinations (COE) Office. Registrations of such candidates for those courses shall be treated as cancelled.

12. Criteria for Passing

The marks for CIA shall be 50% and SEE shall be 50%.

The minimum marks for CIA shall be 40% and SEE shall be 40% for a pass, but the minimum marks for pass per course shall be 50% CIA and SEE added together.

A candidate shall be declared to have passed the UG programme if he/she secures at least CGPA of 5.0 (Course Alpha-Sign Grade P) in the aggregate of both Internal Continuous Assessment and Semester End Examination.

The results of the candidates who have passed the sixth semester examination but not passed the lower semester examinations shall be declared as NCL (Not Completed Lower semester examinations). Such candidates shall be eligible for the degree only after completion of all the lower semester examinations.

13. Grading and Classifications

The results of successful candidates at the end of each semester shall be declared in terms of Grade Point Average (GPA) and Alpha-Sign Grade. The results at the end of the sixth semester shall be classified on the basis of the Cumulative Grade Point Average (CGPA) obtained in all the six semesters and the corresponding overall alpha sign grade.

b. Letter Grades and Grade Points:

i. The Deemed to be University would be following the absolute grading system, where

the marks are compounded to grades based on pre-determined class intervals.

ii. The UGC recommended 10-point grading system with the following letter grades are given below:

Letter Grade	Marks	Grade Point
O (Outstanding)	90-100	10
A+ (Excellent)	80-89	9
A (Very Good)	70-79	8
B+ (Good)	60-69	7
B(Above Average)	55-59	6
P (Pass)	50-55	5
F (Fail)/ RA (Reappear)	Below 50	0
Ab (Absent)		0

*The Marks with 0.5 shall be rounded up to the next whole number.

iii. A student obtaining Grade RA/ Ab shall be considered failed and will be required to reappear in the end semester examination.

c. The Semester Grade Point Average (SGPA)

The performance of a student in a semester is indicated by a number called 'Semester Grade Point Average' (SGPA). The SGPA is the weighted average of the grade points obtained in all the courses by the student during the semester.

For example, if a student takes five (Theory/Practical) in a semester with credits C1, C2, C3, C4 and C5 and the student's grade points in these courses are G1, G2, G3, G4 and G5, respectively, and then students' SGPA is equal to:

$$SGPA = \frac{C1G1 + C2G2 + C3G3 + C4G4 + C5G5}{C1 + C2 + C3 + C4 + C5}$$

The SGPA is calculated to two decimal points. It should be noted that, the SGPA for any semester shall take into consideration the F and ABS grade awarded in that semester. For example if a student has a F or ABS grade in program 4, the SGPA shall then be computed as:

$$SGPA = \frac{C1G1 + C2G2 + C3G3 + C4 * ZERO + C5G5}{C1 + C2 + C3 + C4 + C5}$$

d. Cumulative Grade Point Average (CGPA)

The CGPA is calculated with the SGPA of all the VI semesters to two decimal points and is indicated in final grade report card/final transcript showing the grades of all VI semesters and their courses. The CGPA shall reflect the failed status in case of F grade(s), till the course(s) is/are passed. When the program(s) is/are passed by obtaining a pass grade on subsequent examination(s) the CGPA shall only reflect the new grade and not the fail grades earned earlier. The CGPA is calculated as:

$$CGPA = \frac{C1S1 + C2S2 + C3S3 + C4S4 + C5S5 + C6S6}{C1 + C2 + C3 + C4 + C5 + C6}$$

where C1, C2, C3,…. is the total number of credits for semester I,II,III,…. and S1, S2, S3….is the SGPA of semester I,II,III,…..

Calculation of GPA & CGPA: An example (1st semester)

Program Code	Course	Credits (a)	Grade Obtained	Credit Value (b)	Grade Points (axb)
	Course 1	4	B	8	32
	Course 2	4	B	8	32
	Course 3	4	O	10	40
	Course 4	2	C	7	14
	Course 5	2	A	9	18
	Total	**16**	**-**	**-**	**136**

1st Semester GPA = Total Grade Points / Total Credits = 136 / 16 = 8.5

2nd Semester GPA = 7 with respect to 18 Credits

Then 1st Year CGPA = (8.5 x 16) + (7 x 18) / 16 + 18 = 7.7

14. Any other Information (Progression Criteria, Re-entry after break of the study, Evaluation of Answer Scripts, Internship)

14.1 Progression Criteria

- The students are allowed to carry over any number of courses till sixth semester. But student is eligible to appear for the End semester exam of sixth semester if he/she has cleared all the Courses both Core, AEC, SEC & VAC of first, second, third & fourth semesters. If student has any pending course of first to fourth semesters, he/she is not eligible to appear for the end semester exam of the sixth semester. However, Fifth semester courses are allowed to club with sixth semester end examination. But, all the Core, AEC, SEC & VAC of first to fourth semester should be completed to be eligible for sixth semester End Semester Examination.

- Candidate should clear all Courses (Core, AEC, SEC, VAC & ME) of all the semester, to be eligible to start the one year of mandatory internship.

- A fail in any one Course will mean the candidate has to reappear for the exam in that Course only.

- A candidate who passes the semester examinations in parts is eligible for only CGPA and letter grade but not for award/medal from the University.

14.2 Re-Entry after Break of the study:

Candidates admitted to a program abstaining for more than 3 months must seek readmission into the appropriate semester.

The candidate shall follow the syllabus in vogue (currently approved/is being followed) for the program.

All re-admissions of candidates are subject to the approval of the University.

14.3 Evaluation of Answer Scripts

a. Each theory examination shall have single evaluation. There shall be provision for re-evaluation on a payment of a fee. An external examiner shall value the paper, if the difference is more than 15% of previous marks the answer script shall be sent for third evaluation. In such an event, the average of the best two out of the three scores will be taken as the final score.

b. Practical examination shall be jointly conducted and evaluated by one internal examiner and one external examiner.

14.4 Internship

A candidate has to mandatorily complete 1 year (2 semesters) of internship. The total credit per semester is 20 and for two semesters it is 40.

- **Eligibility:** A candidate should have passed in all the courses (Core, AEC, VAC and Multidisciplinary Electives) amounting to 131 number of credits before entering in to internship.

- **Internship guidelines:** Each semester of Internship shall be minimum of 20 credits. The credits are calculated based on 1 credit = 3 to 5 hours of practical training. There shall be an exit exam at the end of the each semester at the college level.

- **Components of Exit Exam**

Sl. No.	Components	Marks
1	Spotters	30
2	Case scenario/Stations	30
3	Viva Voice	40
Total Marks		100

Particulars of Practical, Viva-Voce

- Practical examination will be aimed at examination of clinical skills and competence of the candidates for undertaking independent work as an Optometrist.

- Viva- Voce examination shall aim at assessing, i.e., depth of knowledge, logical reasoning, confidence &oral communication skills.

- OSCE/OSPE- shall have minimum of 3 stations.

15.SYLLABUS

SEMESTER I

HUMAN ANATOMY & PHYSIOLOGY I

Course: Core

Credits: 04 **Number of hours: 60**

PART A- HUMAN ANATOMY

- **Course Outcomes:**

  At the end of the course, students will be able to:

  CO1: To identify and locate each of the body systems to apply anatomical knowledge to perform minor technical procedural skills.

  CO2: To know the normal disposition of the structures in the body while clinically examining a patient and while conducting clinical procedures.

  CO3: To know the anatomical basis of disease and injury

  CO4: To discuss the interrelationship of systems in maintaining homeostasis.

  CO5: To describe the structure of each body system

- **COURSE CONTENT:**

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type Of Questions
Unit I	4hrs	Introduction: Human body as a whole 1.1 Definition of anatomy and its divisions 1.2Terms of location, positions, and planes 1.3 Cell and its organelles. 1.4Epithelium: definition, classification, describe with examples, function. 1.5 Glands: classification, describe serous & mucous glands with examples. 1.6 Basic tissues: classification with examples 1.7Demonstration: Histology of types of epithelium. Histology of serous, mucous & mixed salivary gland.	√			10%	SE & SA
Unit II	5hrs	Locomotion and support 2.1Bone: classification, names of bone cells, parts of long bone, microscopy of compact bone, names of all bones, vertebral column, inter-vertebral disc, fontanelles of fetal skull. 2.2 Joints: classification of joints with examples, synovial joint (in detail for radiology). 2.3Muscular system: classification of muscular tissue & histology, names of muscles of the body. 2.4 Demonstration: Bones & joints. Histology of compact bone (TS & LS). Demonstration of all muscles of the body. Histology of skeletal, smooth &cardiac muscle (TS & LS). Histology of the 3 types of cartilage. Demo of all bones showing parts, radiographs of normal.	√			15%	LA, SE, SA
Unit III	5hrs	Cardiovascular system 3.1Heart: size, location, chambers, exterior & interior, blood supply of heart 3.2 Systemic &pulmonary circulation, branches of aorta, common carotid artery, subclavian artery, axillary artery, brachial artery, superficial palmar arch, femoral artery, internal iliac artery, peripheral pulse, inferior vena cava, portal vein, Porto-systemic anastomosis, great	√			25%	LA, SE, SA

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type Of Questions
		saphenous vein, Dural venous sinuses. 3.3 Lymphatic system: cisterna chyli& thoracic duct, histology of lymphatic tissues, names of regional lymphatics, axillary and inguinal lymph nodes in brief. 3.4Demonstration of heart and vessels in the body. Histology of large artery, medium sized artery & vein, large vein. Histology of lymph node, spleen, tonsil & thymus. Normal chest radiograph showing heart shadows.					
Unit IV	10hrs	Gastro-intestinal system 4.1 Parts of GIT, oral cavity, lip, tongue, dentition, pharynx, oesophagus, stomach, small and large intestine,liver,gall bladder, pancreas. 4.2 Tonsil, salivary glands extrahepatic biliary apparatus,Waldeyer's ring 4.3Demonstration of parts of gastro intestinal system. Normal radiographs of gastro intestinal system. Histology of gastro intestinal system.	√			30%	LA, SE, SA
Unit V	4hrs	Respiratory system 5.1 Parts of RS, nose, nasal cavity, larynx, trachea, lungs, broncho-pulmonary segments, histology of trachea, lung and pleura, names of paranasal air sinuses. 5.2 Demonstration of parts of respiratory System Normal radiographs of chest. - Histology of lung and trachea.	√			15%	LA, SE, SA
Unit VI	2hrs	Embryology 6.1Spermatogenesis & oogenesis. Ovulation, fertilization. Fetal circulation. Placenta, Demonstration of models.		√		5%	SE, SA

➢ Recommended books:

1. Priya Ranganath, Leelavathy N,Basics in Human Anatomy for BSc Paramedical Courses,Revised and updated edition, The Health
2. Chaurasia BD. Human anatomy. CBS Publisher; 2004.

3. Vishram Singh, Textbook of Anatomy, Revised and updated edition, Elsevier
4. Waugh A, Grant A. , Ross &Wilson Anatomy and physiology in health and illness E-book. Elsevier Health Sciences; 2014 Jun 25.
5. Inderbir S. Textbook of human histology with color atlas. New Delhi: Jaypee BrothersMedical Publishers. 2006.

PART B- PHYSIOLOGY

- **Course Outcomes:**

At the end of the course, students will be able to:

CO1: To demonstrate the understanding of physiological structure of Renal system, endocrine system, Nervous system and special senses.

CO2: To broadly identify the clinical abnormalities of organs and its clinical physiological implications

- **COURSE CONTENT:**

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Types of Questions
Unit I	2hrs	**General Physiology** 1.1 Introduction to physiology 1.2 Homeostasis: Definition, Positive feedback, negative feedback. PH 1.3 Body Fluid Compartments	√	√		15%	SE, SA

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Types of Questions
Unit II	5hrs	**Muscle Nerve physiology** 2.1.1Introduction, Classification and structureof muscle, sarcomere 2.2Neuromuscular junction, Transmission across neuromuscular junction. 2.3 Excitation contraction coupling. Mechanism of muscle contraction, rigor mortis.	√	√		15%	LA, SE, SA
Unit III	7hrs	**Blood** 3.1 Introduction: composition and function of blood. 3.2 Blood Cells: types, Normal Count 3.3 Red blood cells: function. Erythropoiesis: Definition, Stages, Factors affecting 3.4 Hemoglobin: Function, concentration Physiological variation of RBC Count and Hb 3.5 White blood cells: different types, functions, normal count, differential count 3.6 Platelets: origin, normal count, functions. 3.7 Haemostasis: definition, steps, clotting factors, mechanism of clotting, disorders of clotting 3.8 Blood groups: ABO system, Rh system: Rh factor, Rh incompatibility.	√	√		20%	LA, SE, SA

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Types of Questions
		3.9 Blood grouping & typing, cross matching. 3.10 Blood transfusion: indication, universal donor and recipient concept. Selection criteria of a blood donor, transfusion reactions. 3.11 Anaemias: definition, Symptoms and signs (brief). 3.12 Blood indices: colour index, MCH, MCV, MCHC (def and Normal Values). 3.13 ESR and PCV: normal values, definition, determination (methods). 3.14Plasma proteins: types and concentration, functions of albumin, globulin, fibrinogen, prothrombin. 3.15 Blood volume: normal value, determination of blood volume					
Unit IV	8hrs	**Cardiovascular system** 4.1 Heart: physiological anatomy, nerve supply. 4.2Properties of cardiac muscle PH 4.3Cardiac cycle: definition, systole, diastole, phases, JVP(brief) 4.4Cardiac output, stroke volume, EDV (only definitions). 4.5 Heart sounds, normal heart sounds, mechanism and features, areas of auscultation. 4.6 Blood pressure:	√	√		20%	LA, SE, SA

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Types of Questions
		definition, normal value, clinical measurement of blood pressure, hypotension, hypertension 4.7Heart rate: Physiological variations, regulation (brief), radial pulse 4.8Electrocardiogram (ECG): Definition, Normal ECG, Causes of ECG waves, Uses of ECG. 4.9Cardiac shock: Definition, Types (brief), Triple response.					
Unit V	6hrs	**Respiratory system** 5.1Introduction: Functions of respiratory system, physiological anatomy of respiratory system, respiratory tract 5.2Respiratory organs: lungs, alveoli, respiratory membrane 5.3Mechanism of breathing: Inspiration and Expiration, muscles involved, Mechanism. 5.4Surfactant: Composition, Function, 5.5Transport of oxygen: forms of transport, Oxygen Hemoglobin Curve. 5.6Lung volumes and capacities: Spirogram, Definitions and normal Volumes. 5.7Regulation of respiration: Nervous and chemical regulation, respiratory centre, Herring Breur reflexes.	√	√		20%	LA, SE, SA

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Types of Questions
		5.8Hypoxia: Def, Classification, Description (in brief). 5.9 Cyanosis, Asphyxia, Dyspnea, Dysbarism, Artificial Respiration, Apnoea.(Definition Only)					

- **Recommended Books**

1. Guyton (Arthur): Text Book of Physiology. Latest Ed. Prism publishers.
2. Ganong William F: Review of Medical Physiology. Latest Ed. Tata McGraw Hill
3. Chatterjee CC: Human Physiology Latest Ed. Vol-1, Medical Allied Agency.Choudhary Sujith K: Concise Medical Physiology Latest Ed. New CentralBook.

PATHOLOGY & MICROBIOLOGY-I

Course: Core

Credits: 4 **No of Hours: 60 Hours**

PART A- PATHOLOGY

- **Course Outcome:**

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

CO1: Explain the blood cells structure, functions & its formation.

CO2: Enumerate the methods of estimating cell counts.

CO3: Demonstrate blood collection by various methods

- **COURSE CONTENT:**

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type of questions
Unit I	2 hrs	Introduction to Pathology		√		05%	SA
Unit II	12 hrs	Hematology 2.1. Normal constituents of Blood, their structure and functions. 2.2. Collection of Blood samples. 2.3. Various anticoagulants used in hematology. 2.4. Hemoglobin estimation, different methods and normal values. 2.5. RBC count. 2.6. WBC count. 2.7. Platelet count.	√			35%	LA,SE, SA

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type of questions
Unit III	10 hrs	Blood Bank 3.1. Introduction to blood banking. 3.2. Blood group system: ABO & Rh system. 3.3. Methods of blood grouping: Forward & Reverse. 3.4. Donor selection criteria. 3.5. Collection and processing of blood for transfusion.	√			30%	LA,SE, SA
Unit IV	6 hrs	Clinical Pathology 4.1. Collection, transport, preservation and processing of various clinical specimens. □ Urine. □ CSF. □ Stool. □ Sputum. □ Body fluids. 4.2. Urine examination- collection and preservation, Physical, chemical and microscopicexamination for abnormal constituents.	√			30%	LA,SE, SA

- **LA-** Long Answer**, SE-** Short Essay**, SA-** Short Answer

- **Recommended Books**

1) Makroo RN. Blood Transfusion Reactions. In: Compendium of transfusion medicine.2nd ed. 2009;332-345
2) Dr.RamdasNayak ,text book of Hematology and Clinical pathogy.
3) Godkar PB, Godkar DP. Textbook of medical laboratory technology. Bhalani; 2003.

PART B- MICROBIOLOGY

- **Course Outcome:**

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

CO1: The general criteria for microbial classification, Types of culture medias and methods.

CO2: Identify key concepts of immunology.

CO3: Implement the common sterilization and disinfection methods.

CO4: Outline and practice general biomedical waste management.

- **COURSE CONTENT:**

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type of questions
Unit 1	**5Hrs**	**Introduction** 1.1 Introduction & history of Microbiology 1.2 Classifications of microorganisms & structure of bacteria 1.3 Microscopy and types of microscope	✓			**10%**	**LA, SE**
Unit 2	**3 Hrs**	**Growth & Nutrition** 2.1 Nutrition, growth and multiplication of bacteria, Bacterial Growth Curve 2.2 Culture medias 2.3 Culture methods	✓			**10%**	**LA, SE,SA**

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type of questions
Unit 3	**4 Hrs**	**Sterilization & Disinfection** 3.1 Classification of Sterilization and Disinfection 3.2Sterilization:Different methods of sterilization,Principles and use of equipment's of sterilization- Hot Air oven &Autoclave in detail 3.3 Disinfection: Commonly used chemical disinfectants and their uses	✓			**30%**	**LA, SE**
Unit 5	**4 Hrs**	**Infection** 5.1 Infection-Definition, types, sources and mode of transmission 5.2 Hospital acquired infection 5.3 Types of infectious diseases- outbreak, endemic, epidemic, pandemic	✓			10%	**SE,SA**

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type of questions
Unit 6		**Applied Microbiology** 6.1 Biomedical Waste Management: Principles & Practices 6.2 Standard precautions 6.3 Hand hygiene technique and body fluids spill management 6.4 Needle stick injury management-1	✓			**10%**	**SE,SA**

- **LA-** Long Answer**, SE-** Short Essay**, SA-** Short Answer

- **Recommended Books:**

1. Baveja CP. Textbook of microbiology. Arya Publications; 2005.
2. Ananthanarayan R. Ananthanarayan and Paniker's textbook of microbiology. Orient Blackswan; 2006.
3. Owen JA, Punt J, Stanford SA, Jones PP, Kuby J.Kuby immunology. Seventh edition, International edition. Basingstoke: Macmillan Higher Education; 2013

PHYSICAL OPTICS

Course: Core

Credits: 4 **No of Hours: 60 Hours**

- **Course Outcomes:**

At the end of the course, students will be able to:

CO1. At the end of this program, students will be able to predict the distribution of light under various conditions.
CO2 The student is able to name, describe, and combine topics within the area of Diffraction, Polarization and Interference, LASER and Resolution.

- **COURSE CONTENT:**

Unit	Hrs	Content	Must Know	Good to Know	Desirable to know	Weightage	Type Of Questions
Unit I	5hrs	**Nature of light** 1.1.Study on Light as electromagnetic oscillation, wave equation, Ideas of Sinusoidal oscillations, Simple harmonic oscillation	✓			10%	SE, SA
		1.2. Knowledge on transverse nature of oscillation	✓				
		1.3. Brief on Concepts of frequency, wavelength, amplitude and phase		✓			

Unit	Hrs	Content	Must Know	Good to Know	Desirable to know	Weightage	Type Of Questions
		1.4. Electromagnetic Spectrum, Sources of light, Concepts of frequency, wavelength, amplitude and phase	✓				
Unit II	10hrs	**Polarization** 2.1.Introduction to Polarized light; linearly polarized light; and circularly polarized light, Intensity of polarized light;	✓			15%	LA, SE, SA
		2.2.Description on Malus' Law; polarizers and analysers;	✓				
		2.3.Methods of Polarization, Producing polarized light;	✓				
		2.4 Knowledge on Brewster's angle Birefringence; ordinary and extra-ordinary rays.		✓			
Unit III	10hrs	**Interference** 3.1. Relationship between amplitude and intensity	✓			15%	LA, SE,
		3.2. Study on Coherence; Interference**;** constructive	✓				

Unit	Hrs	Content	Must Know	Good to Know	Desirable to know	Weightage	Type Of Questions
		interference, destructive interference					SA
		3.3. Brief on Fringes; fringe width.		✓			
Unit IV	5hrs	**Diffraction** 4.1.Skills on Diffraction, Double slits, multiple slits, gratings.	✓			20%	LA, SE, SA
		4.2.Diffraction by a circular aperture	✓				
		4.3.Study on Airy's disc.			✓		
Unit V	10hrs	**Scattering** 5.1.Resolution of an instrument (telescope, for example)	✓			20%	LA, SE, SA
		5.2.Knowledge on Raleigh's criterion. Scattering; Raleigh's scattering;		✓			
		5.3.Description on Tyndall effect		✓			
		5.4. Relation between Fluorescence and Phosphorescence	✓				
Unit VI	10hrs	**Lasers** 6.1.Introduction to Basics of Lasers– coherence;	✓			10%	SE, SA
		6.2.Description on population in version; Optical Pumping	✓				

Unit	Hrs	Content	Must Know	Good to Know	Desirable to know	Weightage	Type Of Questions
		6.3. Study on spontaneous emission.		✓			
Uniy VII	10hrs	**Radiometry** 7.1.Briefon Knowledge on Radiometry; solid angle; radiometric units	✓			10%	SE, SA
		7.2.Description on photopic and scotopic luminous efficiency and efficacy curves	✓				
		7.3.photometric units, Inverse square law of photometry;					
		7.4.Study on Lambert's law, Other units of light measurement;		✓			
		7.5. Brief on retinal illumination			✓		

❖ **LE**- Long Answer**, SE**- Short Essay**, SA**- Short Answer

➢ **Recommended Books:**

- Subrahmanyan N, BrijLal,A text book of Optics, S. ChandCo Ltd, New Delhi, India, 2003.
- Justin Peatross. Michael Ware. Physics of Light and Optics. Brigham Young University. 2015 Edition.
- Ariel Lipson. Stephen G Lipson. Henry Lipson. Cambridge University Press. South Asian Edition. 2011.

PHYSICAL OPTICS SKILLS

Course: SEC

Credits: 4 **No of Hours: 60 Hours**

- **Course Outcomes:**

At the end of the course, students will be able to:

CO1: At the end of this course, students will be able to predict the distribution of light under various conditions.

CO2: Knowledge and understanding to be demonstrated in the area of wave optics,

CO3: Interaction of light on matter, properties of light and units of light measurement.

- **Course Content:**

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage
Unit I	10hrs	**Gratings** determination of grating constant using Sodium vapor lamp; determination of wave length of light from Mercury vapor lamp.	✓			25%
Unit II	8hrs	**Circular Apertures** Circular Apertures– measurements of Airy's disc for apertures of various sizes.	✓			25%
Unit III	6hrs	**Malus' Law** Verification ofMalus' Law using apolarizer–analyzer combination.	✓			25%
Unit IV	6hrs	**Newton's rings** To determine the radius of the curvature of a	✓			25%

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage
		convex lens surface by forming Newton's rings.				

- **Recommended Books:**

1. Subrahmanyan N, BrijLal,A text book of Optics, S. ChandCo Ltd, New Delhi, India, 2003.
2. Justin Peatross. Michael Ware. Physics of Light and Optics. Brigham Young University. 2015 Edition.
3. Ariel Lipson. Stephen G Lipson. Henry Lipson. Cambridge University Press. South Asian Edition. 2011

ENGLISH AND COMMUNICATION – PART - 1

Course: AEC

Credits: 3 **No of Hours: 45 Hours**

- **Course Outcomes:**

  At the end of the course, students will be able to:

  CO1: Acquire the LSRW (Listening, Speaking, Reading, and Writing) skills. Through Cambridge Interchange Fifth Edition, students will develop real world communication skills- enhancing fluency in speaking, listening, reading and writing – wile mastering grammar, expanding vocabulary and improving pronunciation with supportive digital tools.
  CO2: Learn to appreciate Literature.

  CO3: Be aware of social responsibilities.

  CO4 : Enhance the analytical skill

- **COURSE CONTENT:**

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Types Of Questions
Unit I	10hrs	**UNIT 1: CAMBRIDGE: INTERCHANGE FIFTH EDITION** 1.1 Good Memories 1.2 Life in the City 1.3 Making Changes 1.4 Have you ever tried it? 1.5 Hit the Road. 1.6 Sure. I will do it. 1.7 What do you use this for? 1.8 Time to Celebrate.	√			23%	SA
Unit II	8hrs	**UNIT- II: PHONETICS** 2.1 Brief Introduction 2.2 Classification of Vowels, Diphthongs and Consonants 2.3 Pronouncing the words phonemically and transcribing them into Phonetics 2.4 IPA	√			18%	SA
Unit III	11hrs	**UNIT – III: Grammar and Written Communication** 3.1 Parts of Speech 3.2 Verb Tenses	√			24%	

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Types Of Questions
		3.3 Articles 3.4 Capitalization and Punctuation 3.5 E-mail Drafts 3.6 Formal Letters 3.7 Essay Writing					SA
Unit IV	4hrs	**UNIT – IV : Prose** 4.1 SteevJobs : Commencement Address 4.2 Mother Teresa's Award Winning Speech	√			9%	LE, SE
Unit V	6hrs	**UNIT – V: Poetry** 5.1 The Road Not Taken : Robert Frost 5.2 The Man with the Wooden Leg : Catherine Mansfield 5.3 Our Casuarina Tree : Toru Dutt	√			13%	LE, SE
Unit VI	6hrs	**UNIT – VI : Short Stories** 6.1 Gift of the Magi : O' Henry 6.2 Kabulivala :Raindranath Tagore 6.3 The Blue Umbrella : Ruskin Bond		√		13%	LE, SE

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Types Of Questions

- **LE-** Long Essay**, SE-** Short Essay**, SA-** Short Answer

- **Recommended Books:**

1. Cambridge: Interchange Fifth Edition
2. Contemporary English Grammar Structures & Composition by David Green
3. English Grammar and Composition: Wren & Martin
4. English Grammar in Use by Raymond Murphy

Constitution of India

Course: VAC

Credits: 2 **No of Hours: 30 Hours**

- **Course Outcome:**

At the end of this course, students will gain knowledge on

CO1: This course is to keep the students abreast with the knowledge of the Constitution of India.
CO2: To make the students understand the importance of human rights as citizens of India.

- **COURSE CONTENT:**

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type Of Questions
Unit I	5hrs	**Indian Constitution** • Meaning and Importance of Constitution • The Constituent Assembly • The Preamble • Salient Features of Constitution	√			**10%**	SE, SA
Unit II	3hrs	**Fundamental Rights and Directive Principles** • Meaning and Differences between Fundamental Rights and Directive Principles • Fundamental Rights • Rights Information Act Meaning ,importance of RTI 2005	√			20%	LA, SE, SA

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type Of Questions
Unit III	4hrs	**Union Government** • The President of India-Election ,Powers and Position • Prime Minister and Council of Ministers • Parliament – Loksabha ,Rajyasabha-Organisations and Powers	√			15%	LA, SE, SA
Unit IV	4hrs	**State Government** • The Governor • Chief Minister and Council of Ministers • State Legislature Vidhanasabha ,vidhanaParishad-Organisations and Powers	√			10%	SE, SA
Unit V	2hrs	**Federalism in India** • Meaning Federal and Unitary Features	√			10%	SE, SA
Unit VI	2hrs	**The Judiciary** • The Supreme	√			10%	SE, SA

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type Of Questions
		Court- Organization ,Jurisdiction and Role • The High Court- Organization ,Jurisdiction and Role					
Unit VII	2hrs	**Electoral Process In India** • Election Commission – Organization ,Functions	√			10%	SE, SA
Unit VIII	2hrs	**Local Governments** • Rural and Urban- Organization ,Powers and Functions	√			5%	SE, SA
Unit IX	3hrs	**Human Rights** • Human Rights- Meaning • Universal Declaration of Human Rights • Remedies against Violation of Human Rights in India	√			5%	LA, SE, SA
Unit X	3hrs	**Special Constitutional Provisions** • Special Rights created in the constitution for: Dalits ,Backwards ,Women and	√			5%	SE, SA

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type Of Questions
		Children and the Religious and Linguistic Minorities. • Constitution and Sustainable Development in India • Minority Commission in India					

➢ Recommended Books

- Basu, D.D , Constitution of India, New Delhi Himalaya Publication ; 2001
- Dinesh Shelton, David P Stuart, International Human Rights in Nutshell. Thomas Burgenthel, West Nutshell Publisher; London; 2005.
- ParvathyAppaiah, Constitution of India, Mangalore DivyaDeepa Publication; 2005
- ParvathyAppaiah, Human Rights. DivyaDeepa Publication Mangalore; 2016
- RajRam. M, Constitution of India Himalaya Publication, New Delhi; 1999

HUMAN RIGHTS AND GENDER EQUITY

Course: VAC

Credits: 2 **No of Hours: 30 Hours**

- **Course Outcome:**

  At the end of this course, students will gain knowledge on,

  CO1: Basic Knowledge of Human Rights and its function and authorities in society and industry women's status, issues and gender equity.

- **COURSE CONTENT:**

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type Of Questions
Unit I	5hrs	Human Rights 1.1 Human Rights –Meaning 1.2 Universal declaration of Human Rights	√			20 %	SE, SA
Unit II	5hrs	Human Rights Advocacy 2.1 Global Advocacy of Human Rights; Amnesty International and Other Organisations 2.2 People's Union for Civil Liberty (PUCL) 2.3 Human Rights Commission in India 2.4 Minority Commission in India 2.5 Remedies Against Violation of Human Rights in India	√			25%	SE, SA
Unit III	5hrs	Gender Equity Key Concepts- 3.1 Sex and Gender 3.2 Masculinity and Femininity 3.3 Patriarchy, Matriarchy 3.4 Gender roles and Attributes,Gender Division of Labour 3.5 Gender Bias 3.6 Gender Stereotypes 3.7 Need for Gender Sensitization	√			20%	SA
Unit IV	5hrs	Women's Status in India Important indicators-Sex	√			15%	

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type Of Questions
		Ratio,Education,Health, Nutrition, Maternal and Infant Mortality,Work Participation Rate,And Political Participation.					SE, SA
Unit V	5hrs	Contemporary Women's Issues 5.1 Discrimination Against Girl Child 5.2 Violence Against Women 5.3 Problems of health and nutrition 5.4 Women's Education and Gender Bias in Education 5.5 Trafficking in women 5.6 Globalization and Impact on Women	√			15%	SE, SA
Unit VI	5hrs	State Initiatives for Gender Equity 6.1 Constitutional Rights of Women 6.2 Laws Pertaining to Women 6.3 The National and State Commissions for Women		√		05%	SE

- **Recommended Books:**

1. Parvathy Appaiah,Human Rights, Gender Equity and Environmental Studies, Shivam Books publishers, 2012.
2. Parvathy Appaiah,Human Rights, Gender Equity and Environmental Studies, Jai BharathPrakashan publishers, 2016.
3. Parvathy Appaiah,Human Rights, Gender Equity and Environmental Studies, Jai BharathPrakashan publishers, 2018-19.
4. NirmalChiranjivi:Human Rights in India,NewDelhi,OUP,2001.

SEMESTER II

HUMAN ANATOMY & PHYSIOLOGY II

Course: Core

Credits: 4 **No of Hours: 60 Hours**

PART A- HUMAN NANATOMY

- **Course Outcomes:**

At the end of the course, students will be able to:

CO1. To identify and locate each of the body systems to apply anatomical knowledge to perform minor technical procedural skills.

CO2. To know the normal disposition of the structures in the body while clinically examining a patient and while conducting clinical procedures.

CO3. To know the anatomical basis of disease and injury

CO4. To discuss the interrelationship of systems in maintaining homeostasis.

CO5. To describe the structure of each body system

- **Course Content:**

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	
Unit I	5hrs	Urinary system 1.1 Kidney, ureter, urinary bladder, male and female urethra. 1.2 Demonstration of parts of urinary system. Histology of kidney, ureter, urinary bladder.	√			15%	LA, SE, SA

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	
Unit II	10hrs	Reproductive system 2.1Parts of male reproductive system, testis, vas deferens, epididymis, prostate 2.2 Parts of female reproductive system, uterus, fallopian tubes, ovary 2.3 Mammary gland: 2.4 Demonstration of section of male and female pelvis with organs in situ. Histology of male and female reproductive organs.	√			30%	LA, SE, SA
Unit III	3hrs	Endocrine glands 3.1Endocrine glands: pituitary gland, thyroid gland, parathyroid gland, suprarenal gland 3.2 Demonstration of the glands. Histology of pituitary, thyroid, parathyroid, suprarenal glands.		√		15%	SE, SA
Unit IV	10hrs	Nervous system 4.1 Neuron, classification of nervous system, cerebrum,cerebellum,midbrain,pons, medullaoblongata,spinalcordwithspinalnerve,meninges, ventricles & cerebrospinal fluid, names of basal nuclei, blood supply of brain, cranial nerves. Sympathetic trunk& names of parasympathetic ganglia 4.2 Histology of peripheral nerve & optic nerve. Demonstration of all plexuses and nerves in the body. Demonstration of all parts of brain. Histology of cerebrum, cerebellum, spinal cord.	√			25%	LA, SE, SA
Unit V	2hrs	Sensory organs 5.1 Skin: histology, appendages of skin. 5.2 Eye: parts of eye & lacrimal apparatus. Extra-ocular muscles & nerve supply. 5.3 Parts of ear: external, middle, and inner ear and contents. 5.4 Histology of thin and thick skin. Demonstration and histology of eyeball. Histology of cornea & retina.		√		15%	SE, SA

- **Recommended Books**

1. Chaurasia BD. BD Chaurasia's Human Anatomy. CBS Publishers & Distributors PVt Ltd.; 2010.
2. Sampath Madhyastha, Manipal Manual of Anatomy for Allied Health Sciences,New Delhi: CBS publishers and distributors.

3. Waugh A, Grant A. Ross & Wilson Anatomy and physiology in health and illness E-book. Elsevier Health Sciences; 2014 Jun 25.
4. Dilly PN. Essentials of Human Embryology. Postgraduate Medical Journal. 1984 Jun;60(704):447.
5. Inderbir S. Textbook of human histology with color atlas. New Delhi: Jaypee Brothers Medical Publishers. 2006.
6. Priya Ranganath, Leelavathy N, Basics in Human Anatomy for BSc Paramedical Courses, Revised and updated edition, The Health

PART B- PHYSIOLOGY

➢ Course Outcomes:

At the end of the course, students will be able to:

CO1: To demonstrate the understanding of physiological structure of Renal system, endocrine system, Nervous system and special senses.

CO2: To broadly identify the clinical abnormalities of organs and its clinical physiological implications

➢ COURSE CONTENT:

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Types of Questions
Unit I	2hrs	**General Physiology** 1.1 Introduction to physiology 1.2 Homeostasis: Definition, Positive feedback, negative feedback. PH 1.3 Body Fluid Compartments	√	√		15%	SE, SA
Unit II	5hrs	**Muscle Nerve physiology** 2.1.1Introduction, Classification and structureof muscle, sarcomere 2.2Neuromuscular junction, Transmission across neuromuscular junction. 2.3 Excitation contraction coupling. Mechanism of muscle contraction, rigor mortis.	√	√		15%	LA, SE, SA

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Types of Questions
Unit III	7hrs	**Blood** 3.1 Introduction: composition and function of blood. 3.2 Blood Cells: types, Normal Count 3.3 Red blood cells: function. Erythropoiesis: Definition, Stages, Factors affecting 3.4 Hemoglobin: Function, concentration Physiological variation of RBC Count and Hb 3.5 White blood cells: different types, functions, normal count, differential count 3.6 Platelets: origin, normal count, functions. 3.7 Haemostasis: definition, steps, clotting factors, mechanism of clotting, disorders of clotting 3.8 Blood groups: ABO system, Rh system: Rh factor, Rh incompatibility. 3.9 Blood grouping & typing, cross matching. 3.10 Blood transfusion: indication, universal donor and recipient concept. Selection criteria of a blood donor, transfusion reactions. 3.11 Anaemias: definition, Symptoms and signs (brief). 3.12 Blood indices: colour index, MCH, MCV, MCHC (def and Normal Values). 3.13 ESR and PCV:	√	√		20%	LA, SE, SA

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Types of Questions
		normal values, definition, determination (methods). 3.14Plasma proteins: types and concentration, functions of albumin, globulin, fibrinogen, prothrombin. 3.15 Blood volume: normal value, determination of blood volume					
Unit IV	8hrs	**Cardiovascular system** 4.1 Heart: physiological anatomy, nerve supply. 4.2Properties of cardiac muscle PH 4.3Cardiac cycle: definition, systole, diastole, phases, JVP(brief) 4.4Cardiac output, stroke volume, EDV (only definitions). 4.5 Heart sounds, normal heart sounds, mechanism and features, areas of auscultation. 4.6 Blood pressure: definition, normal value, clinical measurement of blood pressure, hypotension, hypertension 4.7Heart rate: Physiological variations, regulation (brief), radial pulse 4.8Electrocardiogram (ECG): Definition, Normal ECG, Causes of ECG waves, Uses of ECG. 4.9Cardiac shock: Definition, Types (brief),	√	√		20%	LA, SE, SA

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Types of Questions
		Triple response.					
Unit V	6hrs	**Respiratory system** 5.1Introduction: Functions of respiratory system, physiological anatomy of respiratory system, respiratory tract 5.2Respiratory organs: lungs, alveoli, respiratory membrane 5.3Mechanism of breathing: Inspiration and Expiration, muscles involved, Mechanism. 5.4Surfactant: Composition, Function, 5.5Transport of oxygen: forms of transport, Oxygen Hemoglobin Curve. 5.6Lung volumes and capacities: Spirogram, Definitions and normal Volumes. 5.7Regulation of respiration: Nervous and chemical regulation, respiratory centre, Herring Breur reflexes. 5.8Hypoxia: Def, Classification, Description (in brief). 5.9 Cyanosis, Asphyxia, Dyspnea, Dysbarism, Artificial Respiration, Apnoea.(Definition Only)	√	√		20%	LA, SE, SA

- **Recommended Books**

1. Guyton (Arthur): Text Book of Physiology. Latest Ed. Prism publishers.
2. Ganong William F: Review of Medical Physiology. Latest Ed. Tata McGraw Hill
3. Chatterjee CC: Human Physiology Latest Ed. Vol-1, Medical Allied Agency.Choudhary Sujith K: Concise Medical Physiology Latest Ed. New CentralBook.

PATHOLOGY & MICROBIOLOGY-II

Course: Core

Credits: 4 **No of Hours: 60 Hours**

PART A- PATHOLOGY

- **Course objectives:**

CO1: To study fundamental aspects of different groups of microorganisms and their importance.

CO2: To compute medically important infective organisms and their diagnosis.

CO3: To enumerate the common infections of bacteria, virus, parasite and fungi.

CO4: To understand fundamental analytical principles and process used in histopathology

- **COURSE CONTENT:**

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type of questions
Unit I	12 hrs	Histopathology 1.1 Introduction to histopathology 1.2. Grossing technique 1.3. Tissue processing (Fixation, Dehydration, Clearing & Impregnation) 1.4. Embedding technique 1.5. Section cutting 1.6. H&E staining	√			30%	LE,SE, SA
Unit II	6 hrs	Cytology 2.1. Introduction to cytology. 2.2 FNAC 2.3. PAP stain.	√			25%	SE, SA

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type of questions
Unit III	12 hrs	General Pathology 3.1. Cell injury: Agents causing cell injury, cellular adaptations (hypertrophy, atrophy, hyperplasia, metaplasia) reversible and irreversible injury. 3.2. Inflammation: Cardinal signs of inflammation, acute and chronic inflammation. Laboratory tests in inflammation. 3.3. Hemodynamic Edema& shock Thromboembolism & Infarction. 3.4. Neoplasia: Definition of neoplasm, differences between benign and malignant tumors, Carcinogenesis. 3.5. Genetic disorders: Introduction to genetic disease and classification of geneticdisorder.	√			45%	LE,SE, SA

- **Recommended Books:**

1.Histopathology techniques and its management –by Dr.Ramdas Nayak

2.RamnikSood ,Text book of Medical Laboratory Technology 6th Edition, Vol 1 & 2

PART B- MICROBIOLOGY

Course Outcomes:

At the end of the course, students will be able to:

CO1: To outline fundamentals aspects of microbiology including origin, evolution of microorganisms, different groups of microorganisms and their importance, microscopy principles and applications, morphology, and structure.

CO2: To explain microbiological media, isolation, cultivation and enumeration methods of microorganisms, microbial growth characteristics, maintenance, and preservation of microbial cultures

CO3: To develop knowledge on basic immunological concepts.

CO4: To develop knowledge on basic immunological concepts.

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type of questions
Unit I	**11Hrs**	**Systematic Bacteriology** **1.1** Overview of common bacterial infections & bacterial virulence factors and Antimicrobial sensitivity test **1.2** Morphology, pathogenesis and laboratory diagnosis of medically important bacteria (Staphylococcus aureus & MRSA, Pneumococcus. Enterobacteriaceae- Salmonella (Enteric fever), E. coli, Vibrio cholerae, Mycobacterium	✓			**30%**	**LE, SE,SA**

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type of questions
		tuberculosis **1.1** Biochemical reactions and identification of bacteria.					
Unit II	**8Hrs**	**Virology** 2.1 Nutrition, growth and multiplication of bacteria, Bacterial Growth Curve 2.2 Morphology, pathogenesis and laboratory diagnosis of (HIV-1, Hepatitis viruses- Hepatitis B & Hepatitis C virus, Rabies-1, Arbo viruses-Dengue virus	✓			**30%**	**LE, SE,SA**
Unit III	**4 Hrs**	**Mycology** 3.1 Introduction to Mycology-1 3.2 Morphology, pathogenesis and laboratory diagnosis of (Dermatophytes, Candida, Cryptococcus)	✓			**20%**	**LE, SE,SA**
Unit IV	**7Hrs**	**Parasitology** 4.1 Introduction to Parasitology. 4.2 Morphology, Life cycle, pathogenesis and laboratory diagnosis of (E.histolytica, Plasmodium, Ascaris,	✓			**20%**	**LE, SE,SA**

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type of questions
		T.solium, T.saginata, Ancylostoma)					

❖ **LE-** Long Essay**, SE-** Short Essay**, SA-** Short Answer

Recommended Books:

1. Baveja CP. Textbook of microbiology. Arya Publications; 2005.
2. Ananthanarayan R. Ananthanarayan and Paniker's textbook of microbiology. Orient Blackswan; 2006.

BIOCHEMISTRY

Course: Core

Credits: 4 **No of Hours: 60 Hours**

- **Course Outcomes:**

At the end of the course, students will be able to:

CO1: Have knowledge and understanding of procedures of specimen collection, reagent preparation of specimens, performing biochemical tests, interpreting results, and managing biomedical waste effectively.

CO2: Understand the basic procedures in specimen collection, reagent preparation, and testing in a clinical laboratory

CO3: Demonstrate the knowledge of properties of biomolecules and their function.

CO4: Have knowledge of the importance of nutrition in health and diseases.

- **Course Content:**

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Types Of Questions
Unit I	5hrs	**Introduction to Biochemistry and Clinical Laboratory** **1.1Specimencollection:**Preanalytical,variables, collection of blood, Urine, CSF, and other body fluids,anticoagulants and preservatives **1.2 Dilutions:** Dilution of solutions (Preparation of 0.1 N NaCl from 1 N NaCl), Preparation of percent solutions, Preparing working standard from stock standard, Specimen dilutions, Serial dilutions, and Reagent dilution **1.3Special investigations:** Normal values, methods, and interpretation of biochemical parameters. Preparation of patients for special investigations, and	✓ ✓ ✓			15%	LA,SA,SE

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Types Of Questions
		interfering substances **1.4Quality control:** Definition, types, IQAS and EQAS, Calculation of mean, standard deviation and percentage of coefficient variation **1.5Safety measures, Conventional and SI units** **1.6Bio Medical waste management**	✓	✓			
Unit II	10hrs	**Carbohydrate and Lipid chemistry** **2.1**Introduction, Definition, Properties of carbohydrates, Classification with suitable examples. **2.1.1**Biomedical importance of carbohydrates. **2.2**Introduction, Definition, Functions, and Classification of Lipids. Definition and Classification of fatty acids, Essential fatty acids with examples.	✓ ✓ ✓			25%	LA,SE,
Unit III	5hrs	**Protein chemistry and Plasma Proteins** **3.1**Introduction, Definition, and Classification of amino acids with examples. **3.1.1**Peptides: definition & biologically important peptides with examples **3.1.2**Introduction, Definition, and Classification of Proteins with examples **3.1.3**Functions of amino acids and Proteins	✓ ✓ ✓ ✓ ✓ ✓			15%	LA,SE,SA

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Types Of Questions
		3.2 Introduction, types, functions, and biological reference range of plasma proteins. **3.2.1**Immunoglobulins					
Unit IV	5hrs	**Enzymes** **4.1**Introduction, Definition, classification with suitable examples, Active site of enzyme, Factors influencing enzyme activity, **4.1.1**Definition of Cofactor, Coenzyme, And isoenzymes with examples.	✓ ✓			10%	LA,SE,SA
Unit V	10hrs	**Vitamins and Minerals** **5.1**Introduction, Definition, classification, Fat soluble and water-soluble vitamins: Sources, RDA, Biological functions and deficiency disorders. **5.2**Introduction, Definition and classification of macro and micro minerals with examples **5.2.1**Calcium, Phosphorous, iron, Sodium, Potassium: Sources, RDA, Reference ranges, Functions and Disorders of deficiency and excess	✓ ✓ ✓			20%	LA,SE

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Types Of Questions
Unit VI	10hrs	**Nutrition** **6.1**Calorific values of carbohydrates, proteins, and fats **6.2**Nutritional importance of Carbohydrates, lipids, proteins, and Essential amino acids **6.3**SDA: Definition, values for majormacronutrients, Significance of SDA **6.4**Basal metabolic rate (BMR): Definition, Reference range of BMR in men and women, Factors affecting BMR **6.5**Dietary fibers: Definition, functions, importance and their daily requirements Balanced diet **6.6**Essential fatty acids: Definition, functions and deficiency manifestations **6.7**Define the classes of protein-energy malnutrition: marasmus and kwashiorkor.	✓ ✓ ✓ ✓ ✓ ✓			15%	LA.SA,SE

- **Recommended Books**

1) Vasudevan DM, Sreekumari S, Vaidyanathan K. Textbook of Biochemistry for medical students. Jaypee Brothers Medical Publishers; 2019 Sep 30.
2) Satyanarayana U and U Chakrapani. 2013. Biochemistry (version 4th ed). 4th ed. New Delhi: Elsevier Health Sciences APAC.

GEOMETRICAL OPTICS

Course: Core

Credits: 4 **No of Hours: 60 Hours**

- **Course Outcomes:**

At the end of the course, students will be able to:

CO1: At the end of this program, students will be able to predict the basic properties of the images formed on the retina by the optics of the eye.

CO2: The aim is to make students achieve knowledge of the fundamentals of geometrical optics and how they apply to the human eye.

- **Course Content:**

Unit	Hrs	Content	Must Know	Good to Know	Desirable to know	Weightage	Type Of Questions
Unit I	10hrs	**Nature of light** 1.1 Study on Light as electromagnetic oscillation; Ideas of sinusoidal oscillations;	✓			15%	SE, SA
		1.1 .Knowledge on Amplitude and phase; speed of light in vacuum and other media; refractive index.	✓				
		1.2 Brief on Wavefronts: spherical, elliptical and plane; Curvature and vergence; rays;		✓			

Unit	Hrs	Content	Must Know	Good to Know	Desirable to know	Weightage	Type Of Questions
		1.3 convergence and divergence in terms of rays and vergence; vergence at a distance	✓				
		1.4 Description on curvature and vergence			✓		
		1.5 Skills on convergence and divergence in terms of rays and vergence; vergence at a distance	✓				
Unit II	10hrs	**Refraction** 2.1. Advance study on Refractive index	✓			15%	LA, SE, SA
		2.2.Description on its dependence on wavelength	✓				
		2.3.Knowledge on Fermat's and Huygen's Principle	✓				
		2.4 Derivation of laws of reflection and refraction from these principles.		✓			
Unit III	10hrs	**Mirror** 3.1. Introduction on Plane mirror: height and rotation of the mirror.	✓			15%	

Unit	Hrs	Content	Must Know	Good to Know	Desirable to know	Weightage	Type Of Questions
		3.2. Description on imaging by concave mirror and convex mirror.	✓				LA, SE, SA
		3.3. Skills on reflectivity and transmissivity		✓			
		3.4. A brief study on Snell's Law	✓				
		3.5. Study on refraction at a plane surface			✓		
Unit IV	10hrs	**Prism** 4.1.Study on Glass slab: displacement without deviation and dispersion.	✓			20%	LA, SE, SA
		4.2 Description on Thick prism: Angle of prism Deviation produced by a prism Refractive index of prism	✓				
		4.3 Knowledge on Prisms, angular dispersion, despersive power, Abbe's number, sag formula, Paraxial approximation.		✓			
		4.4.Study on Refraction by a spheical surface and sign convention	✓				
		4.5.Introduction to spherical aberration using image formed by a spherical surface of a distance object.		✓			
		4.6.Derivation of vergence equation, Vergence at a			✓		

Unit	Hrs	Content	Must Know	Good to Know	Desirable to know	Weightage	Type Of Questions
		distance formula and effectivity of a refracting surface.					
Unit V	10hrs	**Lens** 5.1. Definition of lens as a combination of two surfaces and different types of lens shapes	✓			20%	LA, SE, SA
		5.2. Image formation by a lens by application of vergence at a distance formula		✓			
		5.3.Definitions of front and back vertex powers; equivalent power		✓			
		5.4. Knowledge on first and second principal planes/points and focal planes/points	✓				
		5.5. Study on Newton's formula; Linear and angular magnification			✓		
Unit VI	10hrs	**Image formation** 6.1. Description on imaging by a thin convex lens; image properties (real/virtual, erect/inverted, magnified/minimized) for various object positions.	✓			15%	LA, SE, SA
		6.2. Description on imaging by a thin concave lens; image properties (real/virtual, erect/inverted, magnified/minimized)	✓				

Unit	Hrs	Content	Must Know	Good to Know	Desirable to know	Weightage	Type Of Questions
		for various object positions.					
		6.3. Knowledge on Prentice's Rule		✓			

❖ **LE-** Long Answer**, SE-** Short Essay**, SA-** Short Answer

➢ **Recommended Books**

1. Schwartz S.H. Geometrical and Visual Optics: A Clinical Introduction, M Graw- Hill, New York, USA, 2002.
2. Subrahmanyan N, BrijLal,A text book of Optics, S. ChandCo Ltd, New Delhi, India, 2003.
3. Justin Peatross. Michael Ware. Physics of Light and Optics. Brigham Young University. 2015 Edition.

GEOMETRICAL OPTICS SKILLS

Course: SEC

Credits: 2 **No of Hours: 30 Hours**

- **Course Outcomes:**

At the end of the course, students will be able to:

CO1: At the end of this program, students will be able to predict the basic properties of the images formed on the retina by the optics of the eye.
CO2: Knowledge and understanding in the areas of: refraction at single spherical or plane surfaces, thin lenses, thick lenses, aberrations, apertures, thin prisms, mirrors and ophthalmic and optical instruments.

- **COURSE CONTENT:**

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage
Unit I	10hrs	**Thick Prism** 1.1. Determination of prism angle and dispersive power; calculation of the refractive index	✓			25%
Unit II	8hrs	**Image formation by spherical mirrors** 2.1.Convex lens-power determination using lens gauge, power determination using distant object method; power determination using the vergence formula	✓			15%
		2.2.Concave lens– in combination with a convex lens–power determination. Imaging by a cylindrical lens– relationship between cylinder axis and image orientation	✓			10%
Unit III	6hrs	**Imaging by two cylinders in contact** 3.1.Determination of the position of CLC;	✓			25%

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage
		verification of CLC using a spherical lens with power equal to the spherical equivalent; orientations and position of the line images and their relation to the cylinders' powers and orientations				
Unit IV	6hrs	**Imaging by a sphero-cylindrical lens sphere and cylinder in contact** 4.1. determination of the position of CLC; verification of CLC using a spherical lens with power equal to the spherical equivalent; orientations and position of the line images and the relation to the cylinder'spower and orientation	✓			25%

- **Recommended Books:**

1. Schwartz S.H. Geometrical and Visual Optics: A Clinical Introduction, M Graw- Hill, New York, USA, 2002.
2. Subrahmanyan N, BrijLal,A text book of Optics, S. ChandCo Ltd, New Delhi, India, 2003.
3. Justin Peatross. Michael Ware. Physics of Light and Optics. Brigham Young University. 2015 Edition

KANNADA

Course: AEC

Credits: 2 **No of Hours: 30 Hours**

- **Course Outcome:**

- Enable students to learn alphabet, words and simple sentences in Kannada.
- Enable students to enhance speaking and writing communicative skills in Kannada and learn technical words related to medical science

- **COURSE CONTENT:**

Unit I: Kannada Letters (vowels, Consonant)

Unit II: Words, Phrases, formation of sentences, Letter Writing, Essay Writing. Treatment related Kannada words (from English to Kannada)

Unit III:
1) Possible communication in kannada between Patients and Doctors.
2) Advising sentences to the possible questions of patients.
3) Some important sentences which enable to communicate with doctors and colleagues.

- **Recommended Books**

- Kannada Vyakarana – (8th ,9th and 10th Karnataka government text books)
- HSK, Vyavarahika Kannada

ENGLISH AND COMMUNICATION – PART - II

Course: AEC

Credits: 3 **No of Hours: 45 Hours**

- **Course Outcomes:**

At the end of the course, students will be able to:

CO1: Acquire the LSRW (Listening, Speaking, Reading, and Writing) skills. Through Cambridge Interchange Fifth Edition, students will develop real world communication skills- enhancing fluency in speaking, listening, reading and writing – wile mastering grammar, expanding vocabulary and improving pronunciation with supportive digital tools.
CO2: Learn to appreciate Literature.

CO3: Be aware of social responsibilities.

CO4 : Enhance the analytical skill

COURSE CONTENT:

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Types Of Questions
Unit I	13hrs	**UNIT – I: CAMBRIDGE INTERCHANGES FIFTH EDITION** 1.1 Only Time Will Tell 1.2 I Like Working with People 1.3 It's Really Worth Seeing 1.4 It's a Long Story 1.5 That's Entertainment 1.6 Now I Get it 1.7 I wouldn't have done that 1.8 Making Excuses	√			29%	SA
Unit II	3hrs	**UNIT – II: Phonetics – IPA Transcription**	√			7%	SA
Unit III	13hrs	**UNIT – III: Grammar and Written Communication** 3.1 Reported Speech 3.2 Modals 3.3 Clauses 3.4 Gerunds	√			29%	SA

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Types Of Questions
		3.5 Active and Passive Voice 3.6 Synonyms and Antonyms 3.7 News Report Writing 3.8 Speech Writing 3.9 Dialogue Writing					
Unit IV	4hrs	**UNIT – IV: PROSE** 4.1 Chicago Address by Swami Vivekananda 4.2 I have a Dream : Martin Luther King	√			9%	LE, SE
Unit V	6hrs	**UNIT – V: Poetry** 5.1 Still I Rise : Maya Angelou 5.2 BTheRaven : Edgar Allen Poe 5.3 Break, Break, Break : Alfred Lord Tennyson	√			13%	LE, SE
Unit VI	6hrs	**UNIT – VI : Short Stories** 6.1 The Luncheon : William Somerset Maugham 6.2 The Power of Prayer : APJ Abdul Kalam 6.3 The Necklace : Guy De Maupassant		√		13%	LE, SE

- **LE**- Long Essay**, SE**- Short Essay**, SA**- Short Answer

- **Recommended Books:**

5. Cambridge: Interchange Fifth Edition
6. Contemporary English Grammar Structures & Composition by David Green
7. English Grammar and Composition: Wren & Martin
8. English Grammar in Use by Raymond Murphy

SEMESTER III

OCULAR PATHOLOGY & MICROBIOLOGY

Course: Core

Credits: 4 **No of Hours: 60 Hours**

- **Course Outcomes:**

At the end of the course, students will be able to:

CO1: Pathology of various parts of the eye and adnexa.

CO2: Will understand the pathogenesis of the diseases caused by the organisms in the human body with reference to the eye infections

CO3: Will understand basic principles of diagnostic ocular Microbiology.

- **COURSE CONTENT:**

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type Of Questions
Unit I	5 hours	Pathology of the diseases in eyelids & Adnexa	✓			10%	SE, SA
Unit II	5 hours	Pathology of the diseases of Conjunctival diseases	✓			10%	SE, SA
Unit III	5 hours	Pathology of the diseases of Cornea	✓			15%	LA, SE, SA
Unit IV	5 hours	Pathology of Crystalline lens disorders		✓		5%	SA
Unit V	5 hours	Pathology of Uveitis.	✓			5%	SA
Unit VI	5 hours	Pathology of Glaucoma.		✓		10%	SE, SA
Unit VII	5 hours	Pathology of Optic nerve disorders.	✓			15%	LA, SE, SA
Unit VIII	5 hours	Ocular Bacteriology-Gram positive (staphylococcus aureus, staphylococcus epidermitis, streptococcus, propino bacterium, acitinomyces), bacteria		✓		5%	SE, SA

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type Of Questions
		including acid fast bacilli (mycobacterium tuberculosis, mycobacterium leprae).					
Unit IX	5 hours	Ocular bacteriology- Gram negative bacteria (pseudomonas, haemophilus, brucella, Neisseria, Moracella), common bacterial infections of the eye.		✓		5%	SE, SA
Unit X	5 hours	Virology: classification of virus in ocular disease, rubella, adenovirus, oncogenic virus, HIV, Common viral infections of the eye		✓		10%	LA, SE, SA
Unit XI	5 hours	Fungi: Yeasts, filamentous, common fungal infections of the eye.		✓		5%	SE, SA
Unit XII	5 hours	Intracellular parasite: Chlamydia, protozoa (Taxoplasmosis, Acanthamoeba.		✓		5%	SE, SA

❖ **LE**- Long Answer**, SE**- Short Essay**, SA**- Short Answer

➢ **Recommended Books:**

1. Corton kumar and robins: Pathological Basis of the Disease, 7th Edition, Elsevier, NewDelhi,2004.
2. A K Khurana: Comprehensive Ophthalmology, 4th edition, new age international (p) Ltd. Publishers, New Delhi, 2007
3. Kanski JJ, Bowling B. Clinical ophthalmology: a systematic approach. Elsevier Health Sciences; 2011 Apr 28.

GENERAL PHARMACOLOGY

Course: Core

Credits: 4 **No of Hours: 60 Hours**

- **Course Outcomes:**

  At the end of the course, students will be able to:

  CO1. Know the basics of Pharmacology like, sources of drugs, routes of drug Administration and general principles

  CO2. Describe the principles of pharmacokinetics and pharmacodynamics

  CO3. To appreciate various adverse drug reactions

  CO4. To have a basic knowledge of drugs affecting various body systems

- **Course Content:**

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Teaching Learning Method	Weightage	Types of Questions
Unit I	8hrs	**General Pharmacology** 1.1Introduction to Pharmacology 1.2 Routes of drug Administration 1.3Absorption & Distribution Metabolism Excretion 1.4 Pharmacodynamics - Mechanism of drug action- receptors 1.5 Factors modifying drug actions 1.6 Adverse drug reactions	√			Lecture	15%	LA, SE, SA
Unit II	6hrs	**Autonomic Nervous System drugs** 2.1 Sympathomimetics 2.2 Alpha blockers 2.3 Beta-blockers 2.4 Cholinomimetics 2.5 Anticholinergics 2.6 Skeletal muscle relaxants	√			Lecture	15%	LA, SE, SA
Unit III	11hrs	**Central Nervous System** **3.1** Opioid analgesics 3.2 Non-opioid analgesics (Prostaglandins) 3.3 NSAIDs 3.4 Ethyl alcohol	√			Lecture	20%	LA, SE, SA

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Teaching Learning Method	Weightage	Types of Questions
		3.5 Sedative hypnotics 3.6 Antiepileptic drugs 3.7 Local anesthetics-1 3.8 Local anesthetics-2 3.9 General anesthetics- I 3.10 G A – II (PAM) 3.11 CNS stimulants						
Unit IV	9hrs	**Cardio Vascular System Drugs** 4.1 Diuretics 4.2 Vasodilators (CCB's, Drugs acting on RAS) 4.3 Antihypertensives 4.4 Antianginal drugs 4.5 Pharmacotherapy of shocks 4.6 Cardiac glycosides 4.7 Cardioplegic drugs 4.8 Antiarrhythmic drugs 4.9 Primary solutions	√			Lecture	15%	LA, SE, SA
Unit V	6hrs	**Blood** 5.1 Anaemia, erythropoietin 5.2 Anticoagulants 5.3 Anti platelet drugs 5.4 Fibrinolytics, 5.5 Lipid lowering drugs 5.6 Vit.D and calcium, folic acid, phosphate			√	Lecture	5%	SE, SA

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Teaching Learning Method	Weightage	Types of Questions
		binders						
Unit VI	1hrs	**Endocrines** 6.1 Corticosteroids			√	Lecture	5%	SE, SA
Unit VII	9 hrs	**Chemotherapy** 7.1 General Principles of Chemotherapy 7.2 Sulfonamides 7.3 Penicillins 7.4 Cephalosporins 7.5 Broad spectrum antibiotics 7.6 Macrolides 7.7 Aminoglycosides 7.8 Chemotherapy of UTI 7.9 Drug Therapy of Tuberculosis	√			Lecture	15%	LA, SE, SA
Unit VIII	10 hrs	**Miscellaneous topics** 8.1 Antihistamines 8.2 Antiemetics 8.3 Drugs used in bronchial asthma 8.4 Drugs used in bronchial asthma-2 8.5 Cough 8.6 Inhalational gases and emergency drugs 8.7 I V fluids 8.8 Metabolic and electrolyte imbalance		√		Lecture	10%	SE, SA

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Teaching Learning Method	Weightage	Types of Questions
		8.9 Immunosuppressants 8.10 Antiseptics and disinfectants						

- **Recommended Books:**

1. ShanBhag T V, Shenoy S& Nayak V.PharmacologyFor Nurses, Elesever; 3rd edition.2023.
2. Udaykumar P. Textbook of Pharmacology for Dental and Allied Sciences. Jaypee Brothers Publishers; 4th edition. 2017.
3. Clark AJ. General pharmacology. Springer Science & Business Media; 2012 Dec 6.

OCULAR PHARMACOLOGY

Course: Core

Credits: 4 **No of Hours: 60 Hours**

- **Course Outcomes:**

At the end of the course, students will be able to:

CO1: Knowledge of Basic principles of pharmacokinetics & Pharmacodynamics

CO2: Commonly used ocular drugs, mechanisms, indications, contraindications,drug dosage, and adverse effects

COURSE CONTENT:

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type Of Questions
Unit I	15 hrs	Introduction to ocular Pharmacology 1.1 Ocular preparations, formulations, and requirements of an ideal Agent 1.2 Ocular Pharmacokinetics- Absorption, distribution, metabolism and excretion of drug, Methods of drug administration: Topical (Eye drops, ointment, suspensions, sustained release drugs and drug delivery system) Methods of drug administration: Periocular andintraocular injections. Systemic administrations - Oral, intramuscular, intravenous, subcutaneous 1.3 Ocular Toxicology - Topical administration (Antibiotics, steroids, anti-glaucoma drugs, anti-allergic drugs, and others), systemic administration: Examples- Digitalis, Chloroquine, Chlorpromazine, Thioridazine, Ethambutol, Steroids	✓			18 %	LA, SE, SA
Unit II	2 hrs	Diagnostic agents 2.1 Fluorescein dye (For ocular surface and Fundus Angiography) Rose Bengal, Lissamine green, Indocyanine green, Trypan blue, Methylene blue	✓			20%	SE, SA
Unit III	2 hrs	Drugs and biological agents used in ocular surgery 3.1 General names, Indications, Viscoelastic substances, Anti		✓		5%	SE, SA

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type Of Questions
		VEGF, Pilocarpine, Epinephrine etc					
Unit IV	2 hrs	Anesthetics used in ophthalmic procedures 4.1 Lignocaine, Bupivacaine, Proparacaine		✓		5%	SE, SA
Unit V	7 hrs	Anti-glaucoma drugs 5.1 Angle closure glaucoma: Mechanism of action and side effects 5.2 Anti-glaucoma drugs for open angle glaucoma -Mechanism of action and side effects	✓			10%	LA, SE, SA
Unit VI	2 hrs	Definition of Accommodative esotropia, Examples of Drugs used in Accommodative esotropia and Side effects.	✓			2%	SE, SA
Unit VII	2 hrs	Cycloplegic and Mydriatic drugs and Miotics: Examples, indications and contraindications	✓			20%	SE, SA
Unit VIII	2 hrs	Definition of Ocular Myasthenia, Examples of Drugs used in ocular myasthenia and Side effects		✓		5%	SE, SA
Unit IX	20 hrs	Pharmacotherapy of ocular infections 9.1 Antibiotics and Anti-chlamy dial: General names, indications and side effects. 9.2 Pharmacotherapy of ocular infections: Antiviral drugs: General names, indications and side effects 9.3 Pharmacotherapy of ocular infections: Antifungal drugs: General names, indications and side effects 9.4 Drugs used in allergic conditions of the eye-General names, indications and side effects 9.5 Drugs used in inflammatory	✓			10%	LA, SE, SA

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type Of Questions
		disorders of the eye: Corticosteroids, indications and side effects 9.6 Drugs used in inflammatory disorders of the eye: NSAIDS, indications and side effects 9.7 Drug treatment of degenerative disorders of the eye- General names, indications and side effects. (Band keratopathy, Retinitis pigmentosa, Pterygium etc) 9.8 Immune-modulators in Ophthalmic practice -Examples and indications					
Unit X	2 hrs	Wetting agents & tear substitutes		✓		2%	SE, SA
Unit XI	2 hrs	Vitamins with emphasis on Vitamin A		✓		2%	SE, SA
Unit XII	2 hrs	Enzymes, Trace elements, antioxidants			✓	1%	SA

❖ **LE**- Long Answer**, SE**- Short Essay**, SA**- Short Answer

Recommended Books:

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

OCULAR ANATOMY & PHYSIOLOGY

Course: Core

Credits: 4 **No of Hours: 60 Hours**

- **Course Outcomes:**

At the end of the course, students will be able to:

CO1: Knowledge in the anatomy of the orbit, eyeball and cranial nerves associated with ocular functions
CO2: Knowledge in the Physiology of the eyeball and cranial nerves associated with ocular functions

- **COURSE CONTENT:**

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type Of Questions
Unit I	5 hours	Central nervous system 1.1 Spinal cord and brain stem 1.2 Cerebellum 1.3 Cerebrum. 1.4 Visual pathway		✓		5%	SE, SA
Unit II	5 hours	Orbit 2.1 Eye 2.2 Sclera 2.3 Cornea 2.4 Choroid 2.5 Ciliary body 2.6 Iris 2.7 Retina-structure and functions	✓			20%	LA, SE, SA
Unit III	4 hours	Refractory media- 3.1 Aqueous humor 3.2 Anterior chamber 3.3 Posterior chamber 3.4 Lens	✓			20%	LA, SE, SA

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type Of Questions
		3.5 Vitreous body					
Unit IV	2 hour	Eyelids	✓			5%	SE, SA
Unit V	4 hours	Conjunctiva	✓			10%	SE, SA
Unit VI	35 hours	Ocular Physiology 6.1 Embryology 6.2 Extrinsic eye muscles, their actions and control of their movements 6.3 Coats of the eyeball 6.4 Crystalline lens and accommodation– presbyopia 6.5 Vision – general aspects of sensation, Visual acuity 6.6 Pigments of the eye and photochemistry 6.7 The visual stimulus, refractive errors 6.8 Visual perception– Binocular vision, stereoscopic vision, optical illusions 6.9 Scotopic and Photopic vision, Color vision 6.10 Ocular, movements, saccades and Pursuits	✓			40 %	LA, SE, SA

❖ **LE-** Long Answer**, SE-** Short Essay**, SA-** Short Answer

➢ **Recommended Books:**

1. A K Khurana: Comprehensive Ophthalmology, 4th edition, new age international (p) Ltd. Publishers, New Delhi, 2007
2. Kanski JJ, Bowling B. Clinical ophthalmology: a systematic approach. Elsevier Health Sciences; 2011 Apr 28.

OPTOMETRIC INSTRUMENTS

Course: Core

Credits: 4 **No of Hours: 60 Hours**

- **Course Outcomes:**

At the end of the course, students will be able to:

CO1: To Understand the importance of different instruments in eye care to diagnose the common visual problems

CO2: To gain theoretical knowledge and basic practical skills in handling the Optometric instruments

CO3: To understand the ability to refract a range of patients with common optometric problems by appropriate objective and subjective means

CO4: To implement the knowledge in the assessment of the need for referral and consultation with other disciplines

➢ COURSE CONTENT:

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type Of Questions
Unit I	20 hours	Refractive instruments 1.1 Optotypes and MTF, Spatial Frequency 1.2 Testchartstandards 1.3 Choice of test charts 1.4 Trial case lenses 1.5Refractor(phoropter)head units 1.6 Trial frame design 1.7Retinoscope–typesavailable 1.8 Adjustment of Retinoscopes-special features 1.9 Objective optometers 1.10Infraredoptometer devices 1.11 Projection charts 1.12 Illumination oftheconsulting room 1.13 Brightnessacuity test 1.14Visionanalyzer 1.15Pupilometer 1.16PotentialAcuity Meter 1.17Abberometer	✓			60%	LA, SE, SA
Unit II	20 hours	Ophthalmoscopes and related devices 2.1 Design of ophthalmoscopes – illumination 2.2 Design of ophthalmoscopes-viewing 2.3 Direct and In-Direct Ophthalmoscopes		✓		10%	SE, SA
Unit III	20 hours	Optometric Instruments 3.1 Lensometer, Lens gaugesor clock 3.2 Slit lamp	✓			30%	

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type Of Questions
		3.3 Tonometers 3.4 Keratometer and corneal topography 3.5 Refractometer 3.6 Orthoptic Instruments (Synaptophore) 3.7 Colour Vision Testing Devices 3.8 Pachymetry 3.9 Fields of Vision and Screening Devices 3.10 Scans 3.11 ERG					LA, SE, SA

- **LE-** Long Answer**, SE-** Short Essay**, SA-** Short Answer

- **Recommended Books:**

1. DavidHenson: OptometricInstrumentations, Butterworth-Heinnemann,UK, 1991
2. A K Khurana: Comprehensive Ophthalmology, 4th edition, new age international (p) Ltd. Publishers, New Delhi, 2007
3. Duke – Elder's Practice of Refraction, Tenth Edition (1978). Revised by David Abrams

CLINICAL OPTOMETRY I

Course: SEC

Credits: 4 **No of Hours: 120 Hours**

- **Course Outcomes:**

At the end of the course, students will be able to:

CO1: The student gains theoretical knowledge and basic practical skill in handling the basic Optometric instruments

- **COURSE CONTENT:**

	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage
Unit I	5 hours	Trial Box and its components	✓			5%
Unit II	10 Hours	Visual Acuity charts/drum-Identification	✓			10%
Unit III	10 hours	Visual acuity assessment using different charts- both distance and near	✓			20%
Unit IV	10 Hours	Choice of test charts- geriatric and pediatric	✓			5%
Unit V	15 hours	Objective Retinoscopy	✓			20%
Unit VI	10 Hours	Direct ophthalmoscopy		✓		5%
Unit VII	10 hours	Torchlight Examination and Keratometry		✓		5%
Unit VIII	10 Hours	Slit lamp Biomicroscopy		✓		10%
Unit IX	15 hours	Lensometry & Hand Neutralization	✓			10%
Unit X	10 Hours	Tonometry (Digital & Others)		✓		5%
Unit XI	15 Hours	Color Vision devices and test procedure		✓		5%

- **Recommended Books:**

1. David Henson: Optometric Instrumentations, Butterworth-Heinnemann,UK,1991.
2. A K Khurana: Comprehensive Ophthalmology, 4th edition, new age international (p) Ltd. Publishers, New Delhi, 2007
3. Kanski JJ, Bowling B. Clinical ophthalmology: a systematic approach. Elsevier Health Sciences; 2011 Apr 28.

SEMESTER IV

OPTOMETRIC & DISPENSING OPTICS

Course: Core

Credits: 4 **No of Hours: 60 Hours**

- Course Outcomes:

At the end of the course, students will be able to:

CO1: Understand the theory behind spectacle lenses and frames, their materials, types, advantages and disadvantages, calculations involved, when and how to prescribe.
CIO2: Impart construction, design application and development of lenses, particularly of the methods of calculating their power and effect.

- **COURSE CONTENT:**

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type Of Questions
Unit I	3hrs	Prisms 1.1 Definition,properties 1.2 Refractionthroughprisms,Thicknessdifference 1.3 Base-apex notation, uses, nomenclature and units, Sign Conventions 1.4 Fresnel's prisms, rotary prisms	√			5%	LA, SE, SA
Unit II	3hrs	Lenses 2.1 Definition, units, terminology used to describe 2.2 form of lenses	√			5%	LA, SE, SA
Unit III	3hrs	3.1Vertex distance and vertex power		√		2%	SA
Unit IV	3hrs	4.1 Lens shape, size and types i.e. Spherical, cylindrical and Sphero-cylindrical	√			5%	LA, SE, SA
Unit V	3hrs	5.1 Transpositions –Simple, Toricand Spherical equivalent	√			4%	LA, SE, SA

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type Of Questions
Unit VI	3hrs	6.1 Prismatic effect, centration, decentration and Prentice rule, Prismatic effect of Plano-cylinder and Sphero-cylinder lenses			√	2%	SE, SA
Unit VII	3hrs	7.1 Magnification in high plus lenses, Minification in high minus lenses	√			4%	LA, SE, SA
Unit VIII	3hrs	8.1Tilt induced power in spectacles	√			4%	SE, SA
Unit IX	3hrs	9.1 Aberration in ophthalmic Lenses.	√			4%	LA, SE
Unit X	3hrs	10.1 Definition and materials (glass, plastic, poly carbonate, triology) Types and characteristics, Properties (Refractive index, Specific gravity, UV cut off, Impact resistance- include drop ball test, Abbe value, Central thickness)	√			5%	LA, SE, SA
Unit XI	3hrs	11.1 Best form of Lenses and safety standards for ophthalmic lenses (FDA, ANSI, ISI, Others		√		4%	LA, SE, SA
Unit XII	2hrs	12.1 Bifocal design, their manufacturing and uses (Kryptop, Univis D, Executive, Invisible, Occupational)	√			5%	LA, SE, SA
Unit XIII	2hrs	13.1 Progressive additional lenses, Modified near vision lenses (Designs, advantages, Limitation)	√			4%	LA, SE, SA
Unit XIV	3hrs	14.1 Lens defects- Description and detection & Glazing and Edging (Manual and automatic)	√			4%	LA, SE, SA
Unit XV	2hrs	15.1 Special lenses (•Iseikonic lenses, Recumbent prism, Fresnel prism and lenses, Lenticular &Aspherical lenses, Photochromic and poloroids, Tinted lens, Tints and filters)	√			5%	LA, SE, SA
Unit XVI	2hrs	16.1 Classification of frames- materials (cover in detail), colours and temple position,	√			6%	LA, SE, SA

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type Of Questions
		advantage and disadvantage, where to use					
Unit XVII	2hrs	17.1 Special purpose frames (sports, kids, reading) Components of spectacle prescription& interpretation, Transposition, Add and Near power relation.		√		4%	LA, SE, SA
Unit XVIII	2hrs	18.1 Frame Selection- based on spectacle prescription, professional requirements, age group, face shape		√		4%	LA, SE, SA
Unit XIX	2hrs	19.1 Measuring inter-pupillary distance for distance and near, bifocal height	√			4%	LA, SE, SA
Unit XX	2hrs	20.1 Lens & Frame markings, Pupillary centres, bifocal heights, progressive markings and adjustments-facial wrap, Pantoscopic tilt	√			4%	LA, SE, SA
Unit XXI	2hrs	21.1 Neutralization – Hand &Lensometer, Axis marking, Prism marking.	√			4%	LA, SE, SA
Unit XXII	2hrs	22.1 Faults in spectacles (Lens fitting, Frame fitting, patient complaints, description, detection and correction.	√			4%	LA, SE, SA
Unit XXIII	2hrs	23.1 Final checking & Dispensing of spectacles to customers, Counselling on wearing & Maintenance of spectacles, Accessories-Bands, Chains, Boxes, Slevets, cleaners, screw driver kit.	√			4%	LA, SE, SA
Unit XXIV	2hrs	24.1 Spectacle repairs- tools, methods, soldering, riverting, frame adjustments.	√			4%	SE, SA

- **LE-** Long Answer**, SE-** Short Essay**, SA-** Short Answer

Recommended Books:

2. Jalie M: The principles of Ophthalmic Lenses, The Association ofDispensing Opticians, London, 1994.

2. Jalie MO: Ophthalmiclensand Dispensing, 3rd edition, Butterworth–Heinemann, 2008

3. Troy E. Fannin, TheodoreGrosvenor: Clinical Optics, 2nd edition, Butterworth – Heinemann, 1996

VISUAL OPTICS

Course: Core

Credits: 4 **No of Hours: 60 Hours**

- **Course Outcomes:**

At the end of the course, students will be able to:

CO1: Student learns various optical components of eye, types of refractive errors, clinical approach in diagnosis and management of various types of refractive errors.

- **COURSE CONTENT:**

❖ **LE-** Long Answer**, SE-** Short Essay**, SA-** Short Answer

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type Of Questions
Unit I	5hrs	Optics of Ocular Structure 1.1 Cornea and aqueous 1.2 Crystalline lens 1.3 Vitreous 1.4 Schematic and reduced eye	√			15%	SE, SA
Unit II	5hrs	Basic aspects of vision 2.1 Visual Acuity 2.2 Light and Dark Adaptation 2.3 Color Vision 2.4 Spatial and Temporal Resolution	√			15%	SE, SA
Unit III	10hrs	Refractiveanomalies and their causes 3.1Etiology of refractive anomalies 3.2Contributing variability and their ranges 3.3populating distributions of anomalies	√			20%	LA, SE, SA
Unit IV	10hrs	Accommodation& Presbyopia 4.1 Far and near point of accommodation 4.2 Range and amplitude of accommodation 4.3Mechanism of accommodation 4.4Variation of accommodation with age			√	15%	LA, SE, SA

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type Of Questions
		4.5 Presbyopia					
Unit V	10hrs	Convergence 5.1 Type 5.2 Measurement and Anomalies 5.3 Relationship between accommodation and convergence-AC/A ratio.		√		15%	LA, SE, SA
Unit VI	10hrs	Objective Refraction (Static& Dynamic) 6.1 Streak retinoscopy 6.2 Principle, Procedure, difficulties and interpretation of findings 6.3 Transposition and spherical equivalent 6.4 DynamicRetinoscopyvarious methods 6.5 Radical retinoscopy and near retinoscopy 6.6 Cycloplegic refraction.	√			20%	LA, SE, SA
Unit VII	10hrs	Subjective Refraction 7.1 Principle and fogging 7.2 Fixedastigmatic dial(Clockdial)Combinationoffixedand rotatordial(Fan and blocktest) 7.3 J.C.C 7.4 Duochrome test 7.5 Binocular balancing-alternate occlusion 7.6 Prism dissociation, dissociate Duochrome balance 7.7 Borish dissociated fogging 7.8 Binocular refraction-Varioustechnique	√				LA, SE, SA

Recommended Books:

1. A H Tunnacliffe:Visualoptics, The Association of British Optician, 1987
2. A.G Bennett &RB Rabbets: Clinical Visual optics,3rdedition, Butterworth Heinemann,1998

OCULAR DISEASES-I

Course: Core

Credits: 4 **No of Hours: 60 Hours**

- **Course Outcomes:**

At the end of the course, students will be Knowledgeable in thefollowing aspects of ocular diseases:

CO1: The etiology, Epidemiology, Symptoms, Signs, Course and sequelae of the disease, Diagnostic approach, and Management of the diseases.

CO 2: To Have a knowledge on clinical relevance and role of optometrist in diagnosing, treating and managing these conditions

- **COURSE CONTENT:**

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type Of Courses
Unit I	10 hrs	**Lids and adnexa** 1.1 Brief on applied anatomy of lids and adnexa	√			**17%**	LA, SE, SA
		1.2 Congenital anomalies: Ptosis, coloboma, Epicanthus, Distichiasis, Cryptophthalmos	√				
		1.3 Detailed study on oedema of the eyelids Introduction on inflammatory disorders like Blepharitis, external hordeolum and internal hordeolum, chalazion	√				
		1.4 Anomalies in the position of the lashes and lid margin: Trichiasis, ectropion, entropion, symblepharon.	√				
		1.5. Anomalies in the position of the lashes and lid margin: blepharophimosis, lagophthalmos, blepharospasm & ptosis	√				

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type Of Courses
		1.6 Brief on Tumors of eyelid and adnexa Papillomas,Xanthelasma,Haemangioma,basal cell carcinoma,squamous cell carcinoma, sebaceous gland melanoma		√			
Unit II	2hrs	**Lacrimal system** 2.1 A brief study on Applied anatomy and physiology of Tear film			√	15%	LA, SE, SA
		2.2 A detailed study on dry eye	√				
		2.3 A detailed study on Watering eye(etiology, clinical evaluation)	√				
		2.4 A detailed study on Dacryocystitis and Dacryoadenitis		√			
Unit III	2hrs	**Conjunctiva** 3.1. Introduction to Applied anatomy& Physiology of conjunctiva			√	15%	LA, SE, SA
		3.2. Detailed description on Inflammations of conjunctiva which includes infective conjunctivitis, Bacterial, chlamydial, Viral, Allergic conjunctivitis	√				
		3.3 Detailed description on degenerative conditions: Pinguecula, Pterygium, Concretions	√				
		3.4 Brief study on Symptomatic conditions: Hyperaemia, chemosis, Ecchymosis, Xerosis and Discoloration of conjunctiva			√		
		3.5 Brief study on Cysts and tumours of conjunctiva			√		
Unit IV	2 hrs	**Lens**				17%	
		4.1.Brief on applied anatomy & physiology	√				
		4.2 Detailed note on Classification of cataract-	√				

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type Of Courses
		Congenital and developmental cataract					
		4.3 Detailed note on Acquired cataract - Senile, traumatic, complicated, metabolic, electric, radiational &Toxic	√				
		4.4 Detailed note on Morphological cataract : Capsular, subcapsular, cortical, supranuclear, nuclear and polar.	√				LA, SE, SA
		4.5 Note on Management of cataract - Non-surgical and surgical measures, preoperative evaluation and types of surgeries		√			
		4.6 Note on Complications of cataract surgery		√			
		4.7 Note on Subluxation & Dislocation, coloboma, lenticonus and Microspheroaphakia		√			
Unit V	2hrs	**Cornea & Sclera**				20%	LA, SE, SA
		5.1. Introduction to Applied anatomy and physiology			√		
		5.3.Detiled study on Episcleritis & scleritis	√				
		5.4 Introduction to Congenital anomalies: Megalocornea, cornea plana,congenital cloudy cornea	√				
		5.5 Note on Inflammations of the cornea: Topographical classifications: ulcerative keratitis and non-ulcerative. Etiological classifications: Infective, allergic, traumatic, idiopathic	√				
		5.6 Degenerations of cornea: Classifications, Arcus senilis, Vogt's white limbal girdle, Hassal-henle bodies, Lipoid keratopathy,		√			

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type Of Courses
		Band shaped keratopathy, Salzmann's nodular degeneration, Droplet keratopathy, Pellucid marginal degeneration					
		5.7 Dystrophies of cornea: Reis buckler dystrophy, Recurrent corneal erosion syndrome, Granular dystrophy, Lattice dystrophy, Macular dystrophy, Cornea guttata,Fuch's epithelial endothelial dystrophy, Congenital hereditary endothelial dystrophy		√			
		5.8 Detiled study on Keratoconus, Keratoglobus	√				
		5.9 Note on Corneal edema, Corneal opacity, corneal vascularisation and Keratoplasty		√			
Unit VI	2hrs	Uveal tract				16%	LA, SE, SA
		6.1. Applied anatomy of uvea			√		
		6.2 Detail on Classification of Uveitis, Etiology& pathology		√			
		6.3 Detail on Anterior Uveitis, Posterior uveitis, Intermediate uveitis, Endophthalmitis, panophthalmitis		√			
		6.4 Brief on Tumour of uveal tract (melanoma)			√		
		6.5 Detail on Clinical examination of uveitis		√			

- **LE-** Long Answer**, SE-** Short Essay**, SA-** Short Answer

Recommended Books:

1. A K Khurana: Comprehensive Ophthalmology, 4th edition, new age international (p) Ltd. Publishers, New Delhi, 2007
2. Kanski JJ, Bowling B. Clinical ophthalmology: a systematic approach. Elsevier Health Sciences; 2011 Apr 28.

CLINICAL OPTOMETRY II

Course: SEC

Credits: 4 **No of Hours: 120 Hours**

- **Course Outcomes:**

At the end of the course, students will be able to:

CO1: Up on completion of the course, the student should be able to gain theoretical knowledge and basic practical skill in handling the Optometric instruments

CO2: The student will be introduced to optical terminology, equipment, and techniques used for treatment.

- **COURSE CONTENT:**

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage
Unit I	10hrs	Lensometer and Hand Neutralization	√			10%
Unit II	10hrs	Vertex distance evaluation using stenopaic slit	√			10%
Unit III	10hrs	Spectacle frame parts	√			10%
Unit IV	10hrs	Measuring IPD Distance in Spectacle	√			5%
Unit V	20hrs	Objective Retinoscopy	√			20%
Unit VI	15hrs	All Subjective Refraction Methods		√		20%
Unit VII	10hrs	Torch light Examination	√			5%
Unit VIII	15hrs	Slit lamp Biomicroscopy (in detail)		√		10%
Unit IX	10hrs	Color Vision devices and test procedure	√			5%
Unit X	10hrs	Visual Acuity testing using Log Mar	√			5%

- **Recommended Books:**

1. A K Khurana: Comprehensive Ophthalmology, 4th edition, new age international (p) Ltd. Publishers, New Delhi, 2007
2. Kanski JJ, Bowling B. Clinical ophthalmology: a systematic approach. Elsevier Health Sciences; 2011 Apr 28.

ENVIRONMENTAL STUDIES

Course: VAC

Credits: 2 **No of hours: 30 hours**

Course Outcome:

At the end of the course, students will be able to:

CO1: Student will be able to learn about environment, factors affecting it, environmental ethics and its protection.

CO2: Student will be able to describe a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, ethical, political, health and safety, manufacturability and sustainability

CO3: Student will be able to critically analyze technical subject matter (Written/ oral) for scientific merit apply learnt environmental knowledge and understanding to solve technical or research problems in new contexts

COURSE CONTENT:

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Question type
Unit I	2 hrs	**Multidisciplinary nature of Environmental Studies** • Multidisciplinary nature of Environmental Studies Environment definition, Components of environment, Scope of environmental studies. Four spheres of earth (Hydrosphere, Atmosphere, Lithosphere and Biosphere) • Concept of sustainability and sustainable development (Brundtland Commission), pillars of sustainability; Sustainable Development Goals (SDGs). • International Agreements: Montreal protocol, Kyoto protocol, Convention on Biological Diversity (CBD)	✓			**5%**	**SE, SA**
Unit II	6 hrs	**Ecosystems** • What is an ecosystem? Ecological units. Structure of an ecosystem; biotic and abiotic components, and function of an ecosystem; energy flow in the ecosystem; biogeochemical cycle, biological interactions, food chains, food webs, ecological pyramids and ecological succession. • Types of ecosystems: a. Terrestrial • Forest ecosystem – tropical evergreen, tropical deciduous,	✓			10%	**SE, SA**

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Question type
		temperate evergreen, temperate deciduous and Taiga/Boreal • Grassland ecosystem – Savannas and Temperate grasslands (Steppes, Pampas, Prairies,Veldtand Downs. • Desert ecosystem – hot and dry, semi-arid, coastal and cold. Plant and animal adaptations. b. Aquatic ecosystems – Marine, Freshwater (lentic and lotic) and Estuarine; Pond as an ecosystem. • Ecosystem services					
Unit III	7 hrs	**Natural Resources** • Classification of natural resources - Renewable and Non-renewable resources • Forest resources: Uses (timber, medicinal, food, economic importance, prevent soil erosion, control floods, religious and cultural practices) and overexploitation (Deforestation, timber extraction, mining, construction of dams). • Water resources: Uses (domestic, agricultural, industrial, electricity and transport) and over utilization of surface and ground water (drying of wells, lakes and ponds, extraction of groundwater, decrease in water table, deterioration of water	✓			15%	**SE, SA**

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Question type
		quality and land subsidence). Floods, Drought, dams – benefits and problems, conflicts over water (state and international) • Land resources: Land as a resource; Land degradation, earthquake, landslides, soil erosion and desertification. • Energy resources: Renewable and non-renewable energy sources, growing energy needs, use of alternate energy sources, case studies (Kochi – first solar powered airport, Tamilnadu – windmills, Gujarat – tidal energy) • Conservation of forest, water, land and energy resources.					
Unit IV	7 hrs	**Biodiversity and its conservation** • Introduction; Levels of biological diversity: genetic, species and ecosystem diversity; Biogeographic zones of India; Global biodiversity hotspots • India as a mega-biodiversity nation; Endangered and endemic species of India • Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts, biological invasions; • Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity. • Ecosystem and biodiversity services: ecological, economic,	✓			15%	**SE, SA**

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Question type
		social, ethical, aesthetic and informational value. • Human wildlife conflicts in Indian – People and wildlife					
Unit V	8 hrs	**Environmental Pollution** Definition • Cause, effects and control measures/managementof: - a. Air pollution b. Water pollution c. Soil pollution d. Light pollution e. Noise pollution f. Thermal pollution g. Radiation pollution • Pollution case studies (London smog, Bhopal gas tragedy, Beijing/Delhi air pollution, Eutrophication, Minamata disease, Exxon Valdez oil spill, Love canal tragedy, Chernobyl disaster) • Climate change, Greenhouse effect, Global warming, Acid rain, Ozone layer depletion. • Solid waste management: control measures of urban and industrial wastes. • Carbon footprint – How to calculate carbon footprint and ways to reduce your carbon footprint. • Human Population growth – impacts on environment • Environmental movements: Chipko movement, Bishnois of Rajasthan,Silent Valley, Narmada bachao andolan	✓			15%	**SE, SA**

- SE- Short Essay, SA- Short Answer

Suggested Readings:

1. Carson, R. 2002. Silent Spring. Houghton Mifflin Harcourt.
2. Gadgil, M., & Guha, R. 1993. This Fissured Land: An Ecological History of India. Univ. of California Press.
3. Gleeson, B. and Low, N. (eds.) 1999. Global Ethics and Environment, London, Routledge.
4. Gleick, P. H. 1993. Water in Crisis. Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute, Oxford Univ. Press.
5. Groom, Martha J., Gary K. Meffe, and Carl Ronald Carroll. Principles of Conservation Biology. Sunderland: Sinauer Associates, 2006.
6. Grumbine, R. Edward, and Pandit, M.K. 2013. Threats from India's Himalaya dams. Science, 339: 36-37.
7. McCully, P. 1996. Rivers no more: the environmental effects of dams (pp. 29-64). Zed Books.
8. McNeill, John R. 2000. Something New Under the Sun: An Environmental History of the Twentieth Century.
9. Odum, E.P., Odum, H.T. & Andrews, J. 1971. Fundamentals of Ecology. Philadelphia: Saunders.
10. Pepper, I.L., Gerba, C.P. & Brusseau, M.L. 2011. Environmental and Pollution Science. Academic Press.
11. Rao, M.N. & Datta, A.K. 1987. Waste Water Treatment. Oxford and IBH Publishing Co. Pvt. Ltd.
12. Raven, P.H., Hassenzahl, D.M. & Berg, L.R. 2012. Environment. 8th edition. John Wiley & Sons.
13. Rosencranz, A., Divan, S., & Noble, M. L. 2001. Environmental law and policy in India. Tripathi 1992.
14. Sengupta, R. 2003. Ecology and economics: An approach to sustainable development. OUP.
15. Singh, J.S., Singh, S.P. and Gupta, S.R. 2014. Ecology, Environmental Science and Conservation. S. Chand Publishing, New Delhi.
16. Sodhi, N.S., Gibson, L. & Raven, P.H. (eds). 2013. Conservation Biology: Voices from the Tropics. John Wiley & Sons.
17. Thapar, V. 1998. Land of the Tiger: A Natural History of the Indian Subcontinent.
18. Warren, C. E. 1971. Biology and Water Pollution Control. WB Saunders.
19. Wilson, E. O. 2006. The Creation: An appeal to save life on earth. New York: Norton.
20. World Commission on Environment and Development. 1987. Our Common Future. Oxford University Press

SEMESTER V

CONTACT LENS-I

Course: Core

Credits: 4 **No of Hours: 60 Hours**

- **Course Outcomes:**

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

CO 1: Understand the basics of contact lenses

CO 2: To have a knowledge on List the important properties of contact lenses

CO 3: To finalise the CL design for various kinds of patients and recognize various types of fitting

CO 4: Understand and Identify, manage the adverse effects of contact lens

- **COURSE CONTENT:**

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type Of Questions
Unit I	05 hrs	Introduction to Contact lenses 1.1 Brief on Definition Classification / Types	√			**05 %**	SE, SA
		1.2 Wearing modalities and replacement schedule	√				
Unit II	5 hrs	2.1History of Contact Lenses	√			05%	SE, SA
Unit III	5 hrs	**Optics of Contact Lenses** 3.1. A detailed study on Magnification& Visual field	√			05%	LA, SE, SA
		3.2. Detailed description on Accommodation&Convergence	√				
		3.3 Detailed description on Back& Front Vertex Power / Vertex distance	√				

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type Of Questions
		calculation					
Unit IV	5hrs	**Review of Anatomy &Physiology**				05%	LA, SE, SA
		4.1. Review ofAnatomy&Physiology of tear film			√		
		4.2 Review ofAnatomy&Physiology of Cornea			√		
		4.3 ReviewofAnatomy&Physiology of Lids and conjunctiva			√		
Unit V	5hrs	**Introduction to CL materials**				05%	LA, SE, SA
		5.1. Introduction to monomers and polymers		√			
		5.2 Detail on contact lens materials	√				
Unit VI	5 hrs	**Properties of CL materials**				5%	LA, SE, SA
		6.1. Detailed description on Physiological (Dk, Ionicity, Water content) properties	√				
		6.2 Detailed description of Physical (Elasticity, Tensile strength, Rigidity) properties	√				
		6.3 Optical(Transmission, Refractive index) properties	√				
Unit VII	1 hrs	**Indications and contraindications**				05%	LA, SE, SA
		7.1. Detailed description on Do's and don't of contact lens wear		√			
Unit VIII	1 hr	**Parameters/ Designs of Contact Lenses &Terminology**				05%	

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type Of Questions
		8.1 Parameters/ Designs of Contact Lenses &Terminology	√				LA, SE, SA
Unit IX	1hrs	**RGP Contact Lens materials**				05%	LA, SE, SA
		9.1 RGP lens materials		√			
Unit X	1hrs	**ManufacturingRigid and Soft Contact Lenses– various methods**				05%	LA, SE, SA
		6.2 Detailed description of manufacturing of soft CL	√				
Unit XI	1hrs	**Pre-Fitting examination– steps, significance, recording of results**				5%	LA, SE, SA
		11.1 Detailed description of history and pre fitting examination	√				
Unit XII	1hrs	**Correction of Astigmatism with RGP lens**				05%	SE, SA
		12.1 Introduction to soft toric			√		
Unit XIII	5 hrs	**Types of fit –Steep, Flat, Optimum – on spherical cornea with spherical lenses**				8%	LA, SE, SA
		13.1 Detailed description of fitting assessment	√				
Unit XIV	5 hrs	**Types of fit –Steep, Flat, Optimum – on Toric cornea with spherical lenses**				5%	LA, SE, SA
		14.1 Detailed description of fitting of CL in caseof toric cornea	√				

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type Of Questions
Unit XV	1hrs	**Calculation and finalising Contact lens parameters**				05%	LA, SE, SA
		15.1 Determination of base, curve, power and diameter	√				
Unit XVI	1hrs	**Ordering Rigid Contact Lenses– writing a prescription to the Laboratory**				02%	SE, SA
		16.2 Detailed description of writing contact lens prescription, ordering and troubleshooting	√				
Unit XVII	1hrs	**Checking and verifying Contact lenses from Laboratory**				05%	LA, SE, SA
		17.1 Troubleshooting of contact lens		√			
Unit XVIII	1hrs	**18.1 Modifications possible with Rigid lenses**			√	01%	SE, SA
Unit XIX	1hrs	**19.1 Common Handling Instructions**	√			01%	SE, SA
Unit XX	1hrs	**Care and Maintenance of Rigid lenses**				10%	LA, SE, SA
		20.1 Cleaning agents& Importance 20.2 Rinsing agents& Importance	√				
		20.3 Disinfecting agents& importance 20.4 Lubricating &Enzymatic cleaners	√				
Unit XXI	5 hrs	**21.1 Followup visit examination**		√		2%	SE, SA
Unit XXII	3hrs	**Complications of RGP lens**		√		3%	LA, SE, SA

❖ **LA-** Long Answer**, SE-** Short Essay**, SA-** Short Answer

Recommended Books:

1. IACLEmodules 1-10

2. Elisabeth A. W. Millis: Medical Contact LensPractice,Butterworth-Heinemann, 2004

BINOCULAR VISION-I

Course: Core

Credits: 4 **No of Hours: 60 Hours**

- **Course Outcomes:**

At the end of the course, students will be able to:

CO1: Demonstrate an in-depth knowledge of thegrossanatomyandphysiologyrelatingtothe extra-ocular muscles.
CO2: Provideadetailedexplanationof,and differentiatebetweentheetiology,investigationand management of binocular vision anomalies.
CO3: Adapt skills and interpret clinical results following investigation of binocular vision anomaliesappropriately and safely.

- **COURSE CONTENT:**

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Types of Questions
Unit I	10 hrs	**Binocular Vision and Space perception.** 1.1 Relative subjective visual direction. 1.2 Retinomotor value 1.3 Grades of BSV 1.4SMP and Cyclopean Eye 1.5 Correspondence 1.6 Fusion, Diplopia, Retinalrivalry 1.7 Horopter 1.8 Physiological Diplopia and Suppression 1.9 Stereopsis, Panum'sarea, BSV 1.10 Stereopsis and monocular clues - significance. 1.11 Egocentric location, clinical applications. 1.12 Theories of Binocular vision.	√			10%	LA, SE, SA

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Types of Questions
Unit II	3 hrs	**Anatomy of Extra OcularMuscles** 2.1 Recti and Obliques, LPS 2.2 Innervation &Blood Supply	√			10%	LA, SE, SA
Unit III	3 hrs	**Physiology of Ocular movements.** 3.1 Center of rotation, Axes of Fick. 3.2 Action of individual muscle.	√			10%	LA, SE, SA
Unit IV	5 hrs	**Lawsofocularmotility** 4.1 Donder's and Listing's law 4.2 Sherrington's law 4.3Hering'slaw	√			10%	LA, SE, SA
Unit V	5 hrs	**Uniocular&Binocularmovements-fixation, saccadic &pursuits.** 5.1 Version &Vergence 5.2 Fixation &field of fixation	√			10%	LA, SE, SA
Unit VI	5hrs	**Near Vision Complex Accommodation** 6.1Definitionand mechanism (process). 6.2Methodsof measurement. 6.3 Stimulusandinnervation 6.4 Typesofaccommodation 6.5 Anomaliesofaccommodation–aetiologyand management		√		10%	LA, SE, SA
Unit VII	5hrs	**Convergence** 7.1 Definition and mechanism 7.2 Methodsofmeasurement 7.3Types and components of convergence- Tonic, accommodative, fusional, proximal. 7.4 Anomalies of Convergence–etiologyand management.	√			10%	LA, SE, SA
Unit	2	**Sensory adaptations**	√			5%	LA, SE,

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Types of Questions
VIII	hrs	8.1 Confusion					SA
Unit IX	5 hrs	**Suppression** 9.1 Investigations 9.2 Management 9.3 Blind spot syndrome	√			5%	LA, SE, SA
Unit X	5hrs	**Abnormal Retinal Correspondence** 10.1 Investigation and management 10.2 Blindspot syndrome		√		5%	LA, SE, SA
Unit XI	5hrs	**Eccentric Fixation** 11.1 Investigation and management	√			5%	SE, SA
Unit XII	5hrs	**Amblyopic** 12.1 Classification 12.2Aetiology 12.3Investigation 12.4Management	√			10%	LA, SE, SA

- **LE-** Long Answer**, SE-** Short Essay**, SA-** Short Answer

Recommended Books:

1. Pradeep Sharma: Strabismus simplified, New Delhi,First edition, 1999, Modern publishers.
2. FionaJ. Rowe:Clinical Orthoptics, second edition, 2004, Blackwell Science Ltd
3. MitchellScheiman;BruceWick:ClinicalManagementofBinocularVisionHeterophoric, Accommodative,andEyeMovementDisorders,2008,LippincotWilliams&Wilkins publishers.

OCULAR DISEASE II

Course: Core

Credits: 4 **No of Hours: 60 Hours**

- **Course Outcomes:**

  At the end of the course, students will be Knowledgeable in thefollowing aspects of ocular diseases:

CO1 The etiology, Epidemiology, Symptoms, Signs, Course and sequelae of the disease, Diagnostic approach, and Management of the diseases.

CO 2 To Have a knowledge on clinical relevance and role of optometrist in diagnosing, treating and managing these condition.

- **COURSE CONTENT**

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type Of Questions
Unit I	20 Hrs	**Retina and vitreous** 1.1 Brief on applied anatomy	√			**20%**	**LA, SE, SA**
		1.2Congenital and developmental disorders (optic disc: coloboma, drusen, hypoplasia, medullated nerve fibres, persistent hyaloid artery)	√				
		1.3Inflammatory disorders retinitis: Acute purulent, Bacterial, viral, mycotic) , Retinal vasculitis (Eales's Disease)	√				

		1.4 Retinal artery occlusion(CRAO) And Retinal vein occlusion (ischaemic, non-ischaemic, branch retinal vein occlusion)	√				
		1.5. Retinal degenerations: Retinitis pigmentosa, Lattice degenerations. Macular Disorders: Solar retinopathy, central serous retinopathy, cystoid macular oedema, Age related macular degeneration	√				
		1.6Diabetic retinopathy Retinal detachment: Rhegmatogenous, tractional, exudative, •Retinoblastoma	√				
Unit II Unit	10 hrs	**Ocular injuries** 2.1 A brief study on Terminology: closed globe injury(contusion, lamellar laceration),open globe injury (rupture, laceration, penetrating injury & perforating injury)	√			15%	LA, SE, SA
		2.2 Mechanical injuries(extraocular foreign bodies, blunt trauma, perforating injury, sympathetic ophthalmitis)	√				
		2.3 Non-mechanical injuries(chemical, thermal, electrical, radiational)	√				
		2.4 Clinical approach towards ocular injury patients	√				

III							
		Clinical neuro ophthalmology 3.1. Anatomy and lesions of the visual pathway			√		
		3.2. Detailed description on Pupillary reflexes and abnormalities(amaurotic light reflex, efferent pathway defect, wernicke'shemianopic pupil, Marcus gunn pupil, Argyll Roberson pupil, adie's tonic pupil)	√			20%	LA, SE, SA
		3.3 Detailed description on Optic neuritis, anterior ischemic optic neuropathy, papilledema Cortical blindness	√				
		3.4 Brief study on Nystagmus and Malingering					
Unit IV	10 hrs	**Glaucoma**				25%	
		4.1.Brief on Applied anatomy and physiology of anterior segment and Clinical examination		√			
		4.2 Definitions and classifications of glaucoma Pathogenesis of glaucomatous ocular damage	√				
		4.3 Detailed note on	√				

		Congenital glaucoma, Primary open angle glaucoma					LA, SE, SA
		4.4 Detailed note on Ocular hypertension, Normal tension glaucoma .	√				
		4.5 Note on Primary angle closure glaucoma Secondary glaucoma	√				
		4.6 Note on Management: common medications, laser interventions and surgical techniques		√			
Unit V	10 hrs	**Orbit**		√		20%	LA, SE, SA
		5.1. Introduction to Applied anatomy and physiology					
		5.2 Detailed study on Proptosis and Enophthalmos			√		
		5.4 Introduction to Developmental anomalies: craniosynostosis, craniofacial dysostosis, hypertelorism, median facial cleft syndrome	√				
		5.5 Note Orbital inflammations (preseptal cellulites, orbitalcellulitis, orbital periositis, caverneous sinus thrombosis	√				
		5.6 Grave's ophthalmopathy	√				

		5.7 Orbitaltumors (dermoids, capillary haemangiomas, optic nerve glioma) Orbital blow out fractures		√			
		5.8 Detailed study on Orbital trauma Approach to a patient with proptosis					

❖ **LE**- Long Answer**, SE**- Short Essay**, SA**- Short Answer

Recommended Books:

1. A K Khurana: Comprehensive Ophthalmology, 4th edition, new age international (p) Ltd. Publishers, New Delhi, 2007
2. Kanski JJ, Bowling B. Clinical ophthalmology: a systematic approach. Elsevier Health Sciences; 2011 Apr 28.

COMMUNITY & OCCUPATIONAL OPTOMETRY

Course: Core

Credits: 4 **No of Hours: 60 Hours**

➢ **Course Outcomes:**

At the end of the course, students will be able to:

CO 1: The Course provides the student with suitable knowledge on foundation and basic sciences of public health optometry with an emphasison the epidemiology of vision problems especially focused on Indian scenario.

CO 2 :Have knowledge on different occupational visual standards

CO 3: Have a knowledge occupational injuries and measures to manage those

CO 4 :Students gain Knowledge in Ocular Problems associated with various occupations

- **COURSE CONTENT:**

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type Of Questions
Unit I	30 hrs	**Public Health Optometry** **1.1** Concepts and implementation, Stages of diseases	√			10 %	SE, SA
		1.2 Levels of disease prevention and levels of healthcare patterns	√			10%	LA, SE, SA
		1.3 Epidemiology of blindness – Defining blindness and visual impairment	√			03%	SE, SA
		1.4 Eye in primary health care	√			07%	LA, SE, SA
		1.5 Community Eye Care &rehabilitation programs			√	05%	LA, SE, SA
		1.6 Nutritional Blindness with reference to Vitamin A deficiency		√		02%	LA, SE
		1.7 Vision 2020: The Right to Sight	√			05%	LA, SE, SA
		1.8 Screening for eye diseases	√			03%	LA, SE, SA

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type Of Questions
		1.9 National and International health agencies, NPCB	√			05%	LA, SE, SA
		1.10 Role of an optometrist in Public Health and in school eye health programmes	√			05%	LA, SE, SA
		1.11 Basics of Tele Optometry and its application in public health		√		05%	LA, SE, SA
		1.12 Introduction to occupational health, Hygeine and safety, international bodies like ILO,WHO, National bodies etc		√		10%	LA, SE, SA
Unit II	30 hrs	**Occupational Optometry**					
		1.1 Colour- Definition, Colour theories, Colour coding, colour defects, colour vision test			√	3%	LA, SE, SA
		1.2 Electromagnetic radiation and its effects on eye			√	3%	SE, SA
		1.3 Occupational hazards and preventive/ Protective methods	√			10%	LA, SE, SA
		1.4 Vision standards-		√		5%	LA, SE, SA

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type Of Questions
		railways, Road ways, Airlines					
		1.5 Visual display units		√		4%	LA, SE, SA
		1.6 Computer vision syndrome	√			5%	LA, SE

- **LE-** Long Answer**, SE-** Short Essay**, SA-** Short Answer

Recommended Books:

1. GVS Murthy, S K Gupta, D Bachani: The principles and practice of community Ophthalmology,Nationalprogrammeforcontrolofblindness, NewDelhi, 2002
2. NewcombRD,JolleyJL:PublicHealthandCommunityOptometry,CharlesCThomas Publisher, Illinois, 1980

CLINICAL OPTOMETRY III

Course: SEC

Credits: 4 **No of Hours: 120 Hours**

- **Course Outcomes:**

At the end of the course, students will be able to:

CO1: Up on completion of the course, the student should be able to gain theoretical knowledge and basic practical skill in handling the Contact Lens and Binocular vision test and procedures.

CO2: The student will be introduced to optical terminology, equipment, and techniques used for treatment.

- **COURSE CONTENT:**

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage
Unit I	10hrs	Soft and RGP Insertion and Removal	√			10%
Unit II	10hrs	Pre fitting Techniques (History, VA testing, HVID,VVID, Keratometry, Schirmer's test and TBUT)	√			10%
Unit III	10hrs	Stereopsis test	√			15%
Unit IV	10hrs	4.1 Convergence evaluation tests(NPC) 4.2 Accommodation Evaluation tests(NPA, NRA, PRA, AC/A ratio, Accommodative facility test) 4.3 EOM Test	√			10%
Unit V	20hrs	Posterior segment evaluation by slit lamp using 90 D lens		√		15%
Unit VI	15hrs	Color Vision devices and test procedure	√			10%
Unit VII	10hrs	Vision Therapy Procedures (Brock String, Cat Card, Hart Chart, Accommodative Flippers)		√		10%
Unit VIII	15hrs	Macular Function tests (Amsler, Photostress, Color vision test)		√		10%
Unit IX	10hrs	Perimetry	√			5%
Unit X	10hrs	Tonometry	√			5%

- **Recommended Books:**

1. A K Khurana: Comprehensive Ophthalmology, 4th edition, new age international (p) Ltd. Publishers, New Delhi, 2007
2. Kanski JJ, Bowling B. Clinical ophthalmology: a systematic approach. Elsevier Health Sciences; 2011 Apr 28.

BIOSTATISTICS

Course: AEC

Credits: 2 **No of Hours: 30 Hours**

- **Course Outcomes:**

  At the end of the course, students will be able to:

CO 1: Understand the concepts of Statistics in the field of Health Professionals.

- **COURSE CONTENT:**

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Types of Question

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Types of Question
Unit I	3 hours	**Introduction** 1.1 Meaning, definition of statistics. 1.2 Importance of the study of statistics. 1.3 Branches of statistics. 1.4 Statistics and health science including nursing. 1.5 Parameters and estimates. 1.6 Descriptive and inferential statistics. 1.7 Variables and their types. 1.8 Measurement scales		√		15%	SA, SE
Unit II	3 hours	**Tabulation of Data** 2.1 Raw data, the array, frequency distribution 2.2 Basic principles of graphical representation 2.3 Types of diagrams - histograms, frequency polygons, smooth frequency polygon, cumulative frequency curve, ogive. 2.4 Normal probability curve.	√			15%	SA, SE
Unit III	4 hours	**Measure of Central Tendency** 3.1 Need for measures of central tendency 3.2 Definition and calculation of mean - ungrouped and grouped 3.3 Meaning, interpretation and calculation of median ungrouped and grouped 3.4 Meaning and calculation of mode. 3.5 Comparison of the mean, and mode.	√			15%	LA, SE

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Types of Question
Unit IV	6 hours	**Measure of Variability** 4.1 Need for measure of dispersion. The range, the average deviation. 4.2 The variance and standard deviation. 4.3 Calculation of variance and standard deviation ungrouped and grouped. 4.4 Properties and uses of variance	√			15%	LA, SE
Unit V	6 hours	**Probability and Standard Distributions** 5.1 Meaning of probability of standard distribution. 5.2 The Binominal distribution. 5.3 The normal distribution. 5.4 Divergence from normality - skewness, kurtosis.	√			15%	SA, SE
Unit VI	5 hours	**Sampling Techniques** 6.1 Need for sampling - Criteria for good samples. 6.2 Various sampling designs. 6.3 Procedures of sampling and sampling designs errors. 6.4 Sampling variation. 6.5 Tests of significance.	√			15%	LA, SA, SE
Unit VII	3 hours	**Health Indicator** 7.1 Importance of health Indicator. 7.2 Indicators of population, morbidity, mortality, health services. 7.3 Calculation of rates and rations of health.		√		10%	SA, SE

- **Recommended Books:**

1. K S Negi, Biostatistics, Third Edition, AITBS Publishers, India, 2020.
2. K VisveswaraRao, Biostatistics a Manual of Statistical Methods for Use in Health
3. Nutrition and Anthropology. 2 nd Edition, JAYPEE, 2009.

SEMESTER VI

CONTACT LENS-II

Course: Core

Credits: 3 **No of Hours: 45 Hours**

- **Course Outcomes:**

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

CO1: Understand the basics of contact lenses

CO 2: To have a knowledge on List the important properties of contact lenses

CO 3: To finalise the CL design for various kinds of patients and recognize various types of fitting

CO 4: Understand and Identify, manage the adverse effects of contact lens

➢ COURSE CONTENT:

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type Of Questions
Unit I	10 hrs	**SCL Materials & Review of manufacturing techniques** 1.1 Brief on Comparison of RGP vs SCL	√			**07 %**	LA, SE, SA
		1.2 Revision on Pre-fitting considerations for SCL			√		
		1.3 Detailed study on fitting philosophies for SCL	√				
		1.4 Review on fitting assessment in Soft Contact Lenses: Types of fit– Steep, Flat, Optimum	√				
Unit II	2hrs	**Calculation and finalising SCL parameters** 2.1 A brief study on Disposable lenses and various classification	√			07%	SE, SA
		2.2 A detailed study on Advantages and availability of contact lenses from different contact lens manufacturing companies	√				
Unit III	2hrs	**Soft Toric CL** 3.1. A detailed study on Stabilization techniques	√		√	25%	LA, SE, SA
		3.2. Detailed description on Parameter selection of soft toric lenses	√				
		3.3 Detailed description on fitting assessment of soft toric lenses	√				
Unit IV	2 hrs	**Common Handling Instructions**				5%	SA
		4.1.Briefon Insertion&Removal	√				SA

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type Of Questions
		Techniques					
		4.2 Briefon Do's and Dont's		√			
Unit V	2hrs	**Care and Maintenance of Soft lenses**				20 %	LA, SE, SA
		5.1. Introduction to Cleaning agents& Importance			√		
		5.2 Detiled study on Rinsing agents& Importance	√				
		5.3 Introduction to Disinfecting agents& importance	√				
		5.4 Note on Lubricating& Enzymatic cleaners	√				
		5.5 Note on Followup visit examination		√			
		5.6 Detail on Complications of Soft lenses		√			
Unit VI	2hrs	**Therapeutic contact lenses**				10%	LA, SE, SA
		6.1. Indications of therapeutic contct lens	√				
		6.2 Detail on Fitting consideration of therapeutic contact lens	√				
Unit VII	2hrs	**Specialty fitting**				26%	LA, SE, SA
		6.1. Fitting of contact lens in Aphakia	√				
		6.2 Fitting of contact lens in Paediatric population	√				
		6.3 Fitting of contact lens in Postrefractive surgery		√			
		6.4 Management of Presbyopia with Contact lenses		√			
		6.5 Management of Orthokeratology – Ortho K lenses & Myopia control		√			
		6.6 Management of corneal degeneartions Scleral			√		

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type Of Questions
		contact lens.					

- **LE-** Long Answer**, SE-** Short Essay**, SA-** Short Answer

Recommended Books:

1. IACLEmodules 1-10
2. Elisabeth A. W. Millis: Medical Contact LensPractice,Butterworth-Heinemann, 2004

BINOCULAR VISION II

Course: Core

Credits: 4 **No of Hours: 60 Hours**

- **Course Outcomes:**

At the end of the course, students will be able to:

CO1: Provide a detailed explanation of, and differentiate between the etiology, investigation and management of binocular vision anomalies.
CO2: Adapt skills and interpret clinical results following investigation of binocular vision anomalies appropriately and safely.

- **COURSE CONTENT:**

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type Of Questions
Unit I	5hrs	1.1 **Classification of neuromuscular Anomalies of the eyes**	√			15%	LA, SE, SA
Unit II	15hrs	**Qualitative and quantitative diagnosis of strabismus** 2.1 History 2.2 Examination and Test 2.3Diagnosis and management 2.4Pseudo strabismus	√			20%	LA, SE, SA
Unit III	5hrs	**Classification and etiology, clinical characteristics, tests and management of** 3.1Comitantesodeviation and exodeviation 3.2A-V Phenomenon 3.3Cyclo vertical squint, DVD, DHD and Cyclo deviation	√			15%	LA, SE, SA
Unit IV	10 hrs	**Paralytic strabismus** 4.1Paralysis of individual extra ocular muscles 4.2Clinical characteristics, diagnostic test and management	√			15%	LA, SE, SA
Unit V	15hrs	**Special forms of strabismus** 5.1 Duane's retraction syndrome 5.2 Brown's syndrome 5.3 Strabismus fixus 5.4 Fibrosis of extra ocular muscles 5.5 Grave's endocrine Ophthalmopathy 5.6 Cyclic Heterotropia 5.7 Fractures of orbital wall 5.8 Myasthenia Gravis 5.9 Chronic progressive external Ophthalmoplegia	√			15%	LA, SE, SA
Unit VI	10 hrs	**Nystagmus** 6.1Types, etiology, clinical characteristics and treatment		√		20%	

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type Of Questions
		6.2 Management of Strabismus 6.3 Nonsurgical - Optical, Pharmacological and Orthoptics 6.4 Surgical Management					LA, SE, SA

- **LA-** Long Answer**, SE-** Short Essay**, SA-** Short Answer

Recommended Books:

1. Pradeep Sharma: Strabismus simplified, New Delhi,First edition, 1999, Modern publishers.
2. FionaJ. Rowe:Clinical Orthoptics, second edition, 2004, Blackwell Science Ltd
3. MitchellScheiman;BruceWick:ClinicalManagementofBinocularVisionHeterophoric,Accommodative,andEyeMovementDisorders,2008,LippincotWilliams&Wilkins publishers.

LOW VISION

Course: Core

Credits: 4 **No of Hours: 60 Hours**

- **Course Outcomes:**

At the end of the course, students will be able to:

CO1: Ability to diagnose and manage patients with vision impairment
CO2: Ability to prescribe low vision devices for distance and near.
CO3: Ability to rehabilitate patients with vocational counselling and activities of daily living

COURSE CONTENT

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type Of Questions
Unit I	15hrs	**Definition and classifications** 1.1 Common causes of Low vision-corneal, Refractive media and Retina 1.2 Epidemiology of Low vision and Model of low vision service	√			15%	LA, SE, SA
Unit II	15hrs	**Pre- clinical evaluation of Low vision clinic.** 2.1 Psychological impact of Low vision on patients 2.2 History taking in Low vision 2.3 Clinical evaluation of Low vision patient	√			20%	LA, SE, SA
Unit III	20 hrs	**Optics of Low vision Aids-Methods of Magnification** **3.1** Types of Low vision Aids, Optical aid, Non-optical aid and electronic Device 3.2 Types of non-optical devices 3.3 Visual field expanders. 3.4 Selection of Low vision aids, Instruction and training, dispensing and prescribing aspects 3.4 Choice of test and aids in various pathological condition	√			15%	LA, SE, SA
Unit IV	10hrs	**Visual rehabilitation and counselling** 4.1 Legal aspects of Low vision in India 4.2 Case analysis	√			15%	LA, SE, SA

❖ **LA**- Long Answer**, SE**- Short Essay**, SA**- Short Answer

Recommended Books:

1. Ajay kumar Bhootra, Low Vision Aids Practice, Second Edition, Jaypee publishers.
2. Ahmed E. A textbook of ophthalmology. Oxford University Press; 1993.

PEDIATRIC & GERIATRIC OPTOMETRY

Course: Core

Credits: 4 **No of Hours: 60 Hours**

- **Course Outcomes:**

At the end of the course, students will be able to:

CO 1: The Course provides the student with suitable knowledge both in theoretical a and practical aspects of ocular health in geriatric and pediatric populations.

CO 2 : To Have a knowledge of the principal theories of childhood development, and visual development

CO 3: 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

CO 4: Have a capacity for highly evolved communication and co-management with other professionals involved in pediatric assessment and care

- **COURSE CONTENT:**

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type Of Questions
Unit I	2 hrs	History taking in paediatric patients 1.1 Knowledge on History taking in paediatric patients	√			5%	LA, SE, SA
Unit II	4 hrs	Assessment of visual acuity 1.1 Introduction to various visual acuity charts as per age 1.2 Introduction to contrast sensitivity chart and its application	√			5%	LA, SE, SA

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type Of Questions
Unit III	4 hrs	Normal appearance, Pathology and structural anomalies 3.1Knowledge on Normal appearance, Pathology and structural anomalies (orbit, eyelids, lacrimal system, conjunctiva, cornea, sclera, anterior chamber, uveal tract, pupil, lens, vitreous, fundus)		√		10%	LA, SE, SA
Unit IV	4 hrs	Refractive examination 4.1 Introduction to Retinoscopy 4.2 Introduction to types of retinoscopy technique 4.1Skills on Refractive examination	√			10%	LA, SE, SA
Unit V	6 hrs	Determination of binocular status and sensory motor adaptation. 5.1. Determination of binocular status 5.2.Determination of binocular status and sensory motor adaptation 5.3 Accommodative - Vergence system 5.4 Extra ocular motility , Saccades & pursuits 5.5 Stereopsis 5.6 Bruckner test	√			10%	LA, SE, SA
Unit VI	4 hrs	Compensatory treatment and remedial therapy 6.1. Compensatory treatment and remedial therapy for myopia, pseudo-myopia, hyperopia, astigmatism, anisometropia, amblyopia		√		10%	LA, SE, SA
Unit VII	4 hrs	Remedial and compensatory treatment 7.1.Remedial and compensatory treatment	√			5%	LA, SE, SA

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type Of Questions
		of strabismus 7.2 Remedial and compensatory treatment of nystagmus					
Unit VIII	6 hrs	Pediatric eye disorders 8.1. Pediatric eye disorders		√		5%	LA, SE, SA
Unit IX	2 hrs	Spectacle dispensing for children	√			5%	SE, SA
Unit X	4 hrs	Paediatric contact lens 10.1.Detail on Paediatric contact lens 10.2.Procedure of Paediatric contact lens Fitting		√		5%	LA, SE, SA
Unit XI	2 hrs	Introduction to geriatric medicine 11.1.Detail on Introduction to geriatric medicine- epidemiology, Need for optometric care, systemic diseases		√		5%	LA, SE, SA
Unit XII	2 hrs	Optometric examination of older adults 12.1.Detail on Optometric examination of older adults 12.2.Skills on recording Optometric examination of older adults	√			5%	LA, SE, SA
Unit XIII	4 hrs	Ocular diseases common in old eye 13.1. Knowledge on Ocular diseases common in old eye with special reference to cataract, glaucoma, macular disorder, vascular diseases of the eye.	√			5%	LA, SE, SA
Unit XIV	4 hrs	Contact lens in elderly 14.1Detail on Paediatric contact lens 14.2Procedure of Paediatric contact lens Fitting			√	5%	LA, SE, SA
Unit XV	4 hrs	Spectacle dispensing in elderly			√	5%	SE, SA

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type Of Questions
		15.1.Knowledge on Spectacle dispensing in elderly					

❖ **LA-** Long Answer**, SE-** Short Essay**, SA-** Short Answer

Recommended Books:

1. A K Khurana: Comprehensive Ophthalmology, 4th edition, new age international (p) Ltd. Publishers, New Delhi, 2007
2. Kanski JJ, Bowling B. Clinical ophthalmology: a systematic approach. Elsevier Health Sciences; 2011 Apr 28.
3. Lyons CJ, Lambert SR, editors. Taylor and Hoyt's Pediatric Ophthalmology and Strabismus. Elsevier Health Sciences; 2022 May 17.
4. Lee AG, Beaver HA. Geriatric ophthalmology: A competency-based approach. Springer; 2009.

CLINICAL OPTOMETRY IV

Course: SEC

Credits: 4 **No of Hours: 120 Hours**

Course Outcomes:

CO1: Up on completion of the course, the student should be able to gain theoretical knowledge and basic practical skill in handling the Contact Lens and Binocular vision test and procedures.

CO2: The student will be introduced to optical terminology, equipment, and techniques used for treatment.

- **COURSE CONTENT:**

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage
Unit I	40hrs	Contact lens Fitting 1.1 RGP Fitting 1.2 Soft toric contact Lens Fitting	√			35%
Unit II	40hrs	Binocular Vision Test Procedures 4.2 Quantitative evaluation of strabismus 4.3 Qualitative evaluation of Strabismus	√			35%
Unit III	30hrs	Low Vision test Procedures (30 hours) 3.1 Distance Low vision devices 3.2 Near low vision devices 3.3 Non- optical devices	√			30%

- **Recommended Books:**

1. A K Khurana: Comprehensive Ophthalmology, 4th edition, new age international (p) Ltd. Publishers, New Delhi, 2007
2. Kanski JJ, Bowling B. Clinical ophthalmology: a systematic approach. Elsevier Health Sciences; 2011 Apr 28.

3. IACLE MODULES 1-10

MEDICAL ETHICS

Course: VAC

Credits: 2 **No of Hours: 30 Hours**

- **Course Outcomes:**

At the end of the course, students will be able to:

CO1: Increasing the awareness and knowledge of students of the value dimensions of interactions with the patients, colleagues, relations andpublic.

CO2: Fostering the development of skills of analysis, decision making and judgment.

CO3: Making the students aware of the need to respect the rights of the patient.

- **COURSE CONTENT:**

UNIT	NO. OF HOURS	CONTENT	MUST KNOW	GOODTO KNOW	DESIRABLE TOKNOW	WEIGHTAGE %	TYPE OF QUESTIONS
Unit I	3	**Introduction to ethics** What is ethics, what are values and norms, freedom and personal responsibility?	✔			15	SA, SE
Unit II	4	**Definition of medical ethics** Major principles of medic ethics.	✔			20	LE, SA

UNIT	NO. OF HOURS	CONTENT	MUST KNOW	GOODTO KNOW	DESIRABLE TOKNOW	WEIGHTAGE %	TYPE OF QUESTIONS
Unit III	4	**Perspective of medical ethics** The Hippocratic oath, The Declaration of Helsinki, The WHO Declaration of Geneva, International code of Medical Ethics (1993),Medical Council of India Code of Ethics (2002).	✔			15	LE, SA, SE
Unit IV	4	**Ethics of the individual** Truth and confidentiality, the concept of disease, health and healing, theRighttohealth.	✔			15	SE
Unit V	3	**The ethics of human life** Prenatal sex determination.	✔			15	SA, SE
Unit VI	4	**The family and society in medical ethics**		✔		10	LE, SA

UNIT	NO. OF HOURS	CONTENT	MUST KNOW	GOODTO KNOW	DESIRABLE TOKNOW	WEIGHTAGE %	TYPE OF QUESTIONS
		Euthanasia, cancer and terminal care.					
Unit VII	4	**Death and dying** Use of life-support systems, the right to die with dignity, suicide– the Ethical outlook.		✔		05	LE, SA, SE
Unit VIII	4hrs	**Professional Ethics** Contract and confidentiality, malpractice and negligence.		✔		05	SA, SE

- **LE-** Long Essay**, SE-** Short Essay**, SA-** Short Answer

- **Recommended Books:**

1. Tsai DF. The WMA medical ethics manual. Journal of Medical Ethics. 2006 Mar 1;32(3):163
2. Loewy EE, Loewy RS. Textbook of healthcare ethics. Springer Science & Business Media; 2004 Jun 29.

INTERNSHIP (SEMESTER VII &VIII)

Eligibilty:

A candidate should have passed in all the courses (Core, AECC and Electives) amounting to 131 number of credits before entering in to internship.

Duration:

A candidate has to mandatorily complete 1 year (2 semesters) of internship. The total credit per semester is 20 and for two semesters it is 40.

Objectives:

1. Be able to develop skills to provide comprehensive eye examination
    a. To acquire knowledge on ocular structures, its functions and pathological changes
    b. To carryout ophthalmic investigations
    c. To impart knowledge with regard to common eye diseases
    d. To impart knowledge on treatment modalities from the perspective of counselling
    e. To acquire knowledge about the referral guidelines for ocular and systemic conditions.
2. Be able to correct refractive error and provide spectacle prescription

3. Be able to fit, evaluate, prescribe and dispense contact lenses for refractive correction and other ocular conditions

4. Be able to assess the low vision and provide comprehensive low vision care.

5. Be able to do complete binocular vision assessment, manage non-strabismic binocular vision anomalies and refer condition which warrants surgery

6. Be able to assess the visual demands for various occupations and match it to the visual capabilities. Also be able to advice on eye safety wear for various occupations.

7. Have knowledge and skill for early detection of various ocular conditions and pathologies – Refractive error, Strabismus, Cataract, Diabetic retinopathy, Glaucoma etc.

Learning Outcomes

Sl. No.	Learning Outcomes	Knowledge	Application/Evaluation
1.	Develop skills on Comprehensive eye examination	Knowledge on ocular structures, its functions and pathological changes	Determines tests and Procedures to the patient's ocular condition, and performs the tests and arrange follow ups on the basis of findings.
2.	Develop skills in performing Qualitative History taking before comprehensive evaluation.	Able to Collect and review background information relevant to the patient's health before performing the Ocular Evaluations.	Develop Rapport to obtain history and current health status.
3.	Develop skills on Correcting refractive errors.	Knowledge on Evaluating, Prescribing and dispensing Optical devices such as Spectacle, Contact Lens, Prism and Low vision devices.	Performs the tests, Determines and responds properly for the appropriate optical device based on the ocular findings.
4.	Acquiring skills on complete binocular vision assessment and in managing non-strabismus binocular vision anomalies	Knowledge on Performing binocular vision assessments and diagnose non-strabismus binocular vision anomalies to refer condition which warrants surgery	Performs Quantitative and Qualitative analysis of Strabismus and diagnose strabismus and Non strabismus conditions for further management options.
5.	Develop skills to	Knowledge on Ocular health and	Evaluates and Also be able to

	assess the visual demands for various occupations and match it to the visual capabilities.	requirements in Various Occupations.	advice on eye safety wear for various occupations.
6.	Developing skills and knowledge in conducting Screening Eye Camps and awareness of ocular health.	Knowledge and skill for early detection of various ocular conditions and pathologies such as Refractive error, Strabismus, Cataract, Diabetic retinopathy, Glaucoma etc.	Complete comprehensive history taking and evaluations of various ocular conditions and guidance to the patient on further follow ups.

INTERNSHIP TRAINING RULES AND CODE OF CONDUCT

1. The duration of the internship shall be a minimum of one year or 2 semesters (8 hours of practice a day, totalling to 40 credits).

2. The Interns shall be entitled for 12 day total leave on any account during the entire period of Internship and no other leave shall be permissible.

3. The candidate is expected to work for minimum 8 hours per day and this may be more depending on the need and the healthcare setting.

4. If the period of leave exceeds the sanctioned limit, Internship is liable to be extended at the discretion of the authority. In case of Emergency any additional leave asked for shall be discretion of the authority and will be doubled.

5. The attendance of all the interns shall be marked/monitored by the respective Clinical coordinator and concerned HOD, by maintaining the intern's attendance register. All the interns are directed to mark their attendance, by putting their full initials (specimen signature to be given to the Clinical coordinator).

6. Interns shall observe duties as per the roaster devised by the department, and no change in duty shall be permissible without the permission of clinical coordinators Interns shall be courteous, polite, respectful and sympathetic towards the patients, their accompanying attenders, hospital staff and their colleagues.

7. Intern shall maintain decorum and commitment and discipline of the profession and show keen interest in patient care.

8. The interns will be entrusted with clinical responsibilities under supervision of the senior

Technician/Technologist and are expected to discharge the duties assigned to them sincerely & effectively.

9. Aprons/scrubs & ID is mandatory while reporting to the Hospital and always carry the required articles needed for examination of the patients. A fine of Rs.500/- will be charged from the interns not using white coat/scrubs and identification card during their duty in the Hospital.

10. Scrubs should be worn inside the campus only. If found outside, a fine of Rs 500/- will be charged.

11. The performance shall be assessed based on the assessment sheet provided in the Log Book.

12. Maintainssafeand cleanworking environmentbycomplyingwithprocedures,rules,andregulations.

13. Provides continuousofcarebydevelopingandimplementing patient-managementplans.

14. Each semester of Internship shall be minimum of 18 credits.The credits are calculated based on 1 credit = 3 to 5hoursofpractical training. Thereshallbean exitexam atthe end of theeachsemester

INTERNSHIPCOMPLETION

Thestudent shouldscore aminimum 50%marks tobeeligibleforthe Internship completioncertificate.

ANNEXURES

List of Annexures:

- ANNEXURE – I: Question Paper Layout for Theory of Internal Assessment and Semester End Examination of Theory Examination (Core)
- ANNEXURE – II: Question Paper Layout of Theory for Internal Assessment and Semester End Examination of AEC & VAC
- ANNEXURE III – OSPE CHECHLIST FOR SEC
- ANNEXURE IV: Internship Assessment and Evaluation Format
- ANNEXURE V: Logbook Format

ANNEXURE – I: Question Paper Layout for Theory of Internal Assessment and Semester End Examination of Theory Examination (Core)

Model Question Paper

I Semester B.Optometry

Time: 2 Hours Max. Marks: 50 Marks

SUBJECT NAME:
Q.P Code:
Your answer shall be specific to question asked.
Draw neat and labeled diagrams wherever necessary.

LONG ESSAY (Answer any One) **(1x10=10Marks)**

1.
2.

SHORT ESSAY (Answer any Five) **(5x4=20Marks)**

3.
4.
5.
6.
7.
8.
9.

SHORT ANSWERS (Answer any Ten) **(10x2=20Marks)**

10.
11.
12.
13.
14.
15
16.
17.
18.
19.
20.
21

ANNEXURE – II: Question Paper Layout of Theory for Internal Assessment and Semester End Examination of AEC & VAC

Model Question Paper

I Semester B.Optometry

Time: 2 Hours Max. Marks: 25 Marks

Constitution of India

Q.P Code:

Your answer shall be specific to question asked.

Draw neat and labeled diagrams wherever necessary.

LONG ESSAY (Answer any Three) **(3x5=15Marks)**

1.

2.

3.

4.

5.

SHORT ANSWERS (Answer any Five) **(5x2=10Marks)**

6.

7.

8.

9.

10.

11.

12.

ANNEXURE III – OSPE CHECHLIST FOR SEC

OSCE Assessment Checklist

Criteria	Achieved	Not Achieved	Remarks
Station Preparation			
Instructions clear and visible	■	■	
Equipment and patient/simulator ready	■	■	
Examiner has marking scheme	■	■	
Time clearly indicated	■	■	
History Taking / Data Gathering			
Introduces self, confirms identity	■	■	
Explains purpose, seeks consent	■	■	
Uses open and closed questions	■	■	
Elicits relevant history	■	■	
Clarifies patient concerns/expectations	■	■	
Clinical Examination			
Washes hands / infection control	■	■	
Explains procedure to patient	■	■	
Performs exam systematically	■	■	
Uses instruments correctly	■	■	
Identifies key findings	■	■	
Clinical Reasoning			
Interprets findings accurately	■	■	
Suggests differential diagnoses	■	■	
Recommends appropriate investigations	■	■	
Proposes initial management plan	■	■	
Communication Skills			
Establishes rapport, maintains eye contact	■	■	
Uses clear, empathetic language	■	■	
Checks patient understanding	■	■	
Provides health education/counseling	■	■	
Professionalism			
Maintains patient dignity &confidentiality	■	■	
Respects patient’s cultural/social background	■	■	

Criteria	Achieved	Not Achieved	Remarks
Demonstrates confidence without arrogance	■	■	
Works within ethical boundaries	■	■	

YENEPOYA
(DEEMED TO BE UNIVERSITY)

OSPE Assessment Checklist

Criteria	Achieved	Not Achieved	Remarks
Station Setup			
Station instructions clear &concise	■	■	
Required equipment/materials available &functional		■	
Adequate time allotted for task	■	■	
Standardized patient/simulator prepared (if applicable)	■	■	
Answer sheet/marking scheme ready			
Student Performance - Knowledge & Understanding			
Demonstrates understanding of concept/ procedure	■	■	
Answers station-specific questions correctly			
Student Performance - Skills &Technique			
Performs steps in logical sequence	■	■	
Handles instruments/equipment correctly	■	■	
Maintains aseptic/standard precautions	■	■	
Completes task within allocated time			
Student Performance - Communication			
Explains procedure to patient/supervisor	■	■	
Uses appropriate medical terminology	■	■	
Seeks consent where required			
Student Performance - Professionalism			
Maintains patient respect &privacy	■	■	
Demonstrates confidence & ethical behavior			
Assessment &Scoring			
Structured checklist/marking scheme used	■	■	
Marks allocated for each step	■	■	
Negative marking avoided unless justified	■	■	
Examiner consistency ensured across students			
Logistics & Examiner Role			
Examiner briefed & calibrated before OSPE	■	■	
No coaching/hints given during station	■	■	
Feedback documented for student Performance	■	■	

ANNEXURE – IV: Internship Assessment and Evaluation Format

RUBRICSFORCLINICALEVALUATION:

SI.No.	Components	Marks
1	Spotters	30
2	Case scenario/Stations	30
3	Viva Voice	40
Total Marks		100

Exit Exam shall be conducted by the College and the marks shall be sent to the COE for needful.

PARTICULARS OF PRACTICAL, VIVA-VOCE

- Practical examination will be aimed at examination of clinical skills and competence of the candidates for undertaking independent work as a specialist.
- Viva- Voce examination shall aim at assessing, i.e., depth of knowledge, logical reasoning, confidence &oral communication skills.
- OSCE/OSPE- shall have minimum of 3 stations.

LOG BOOK

- Documentationofone clinicalcaseperdayandtobeverifiedbytherespectiveclinicalIncharge.
- Submissionoflogbook tobedonefortnightly andverified bythecoordinator.

ANNEXURE – VI: Record book Format

RECORD BOOK- 2025 BATCH

Bachelor of Optometry (B. Optom)

Name :

Reg. No. :

Academic Year :

YENEPOYA SCHOOL OF ALLIED HEALTH SCIENCES

*Constituent Unit of***Yenepoya (Deemed to be University)**

Academic Details

Name: _____

Register ID: _____

Campus ID : _____

Semester : _____

Batch : _____

Academic Year :_____

Name of the Centre :_____

Signature of Student **Programme Coordinator**

YENEPOYA SCHOOL OF ALLIED HEALTH SCIENCES

Constituent Unit of **Yenepoya (Deemed to be University)**

CERTIFICATE

This is to certify that the candidate Mr/Ms……

Reg.No ……..……., admitted in the year ……to the Yenepoya School of Allied Health Sciences, a constituent college of Yenepoya (Deemed to be University) has satisfactorily completed the requirements mentioned in this logbook for ……Semester, B.Optometry during the period from …… to……...

CLINICAL COORDINATOR **PROGRAMME COORDINATOR**

General instructions

1)This is a record of the clinical activities of the student,who would beresponsible for maintaining his/her logbook.

2) It is the responsibility of the student to enter the training details, which is required to be verified by the Clinical Supervisor daily.

3) The Programme Coordinator will scrutinize/verify that the training is as per the Specific Learning Objectives.

4) The logbook is a record containing the students':

- Overall participation & performance.
- Clinical training attendance.
- Acquisition of required competencies and skills.
- Acquiring the specific learning outcome.

Specific learning objectives

1. Be able to develop skills to provide comprehensive eye examination.
2. To acquire knowledge on ocular structures, its functions and pathological changes.
3. To carryout ophthalmic investigations.
4. To impart knowledge with regard to common eye diseases.
5. To perform Slit Lamp Illumination techniques.
6. To perform Ophthalmoscopy and fundus evaluation.
7. To perform basic practical skills in handling the instruments for ocular examination.

INDEX

SI. No.	Reported on	Department/ Unit	Completed on	Remarks	Signature of the Clinical Supervisor

DAILY EVALUATION

SI. No.	Date	Observation	Remarks	Signatureof theClinical Supervisor

OPTOMETRY DATA SHEET

Name:

Age:

Sex:

IP No:

Address: _____

Door to Door Screening Date: _____ Occupation: _____

Contact No. or ID No.: _____

B. Medical History

Chief Complaint: _____

History & Current Medication: _____

DM / HT: _____

VISION UNAIDED

	Distance	Near	Ph
OD			
OS			

VISION AIDED

	Distance	Near	Ph
OD			
OS			

PGP: _____

Objective Refraction

	Sph	Cyl	Axis
OD			
OS			

CASE SHEET

Case No:

Posting:

MRD No:

Age/Sex:

Chief complaints:

Past Ocular History: **Current Medication:**

Past Medical History: **Recent Investigations:**

Family history:

Birth history:

Allergy history:

VISUAL ACUITY **DISTANCE** **NEAR**

OD **OS** **OD** **OS**

A) _____

Unaided

B) _____

Visual Acuity with Pinhole

C) Previous Glass Vision

D) Previous Glass Power

	OD	OS

	Spherical	Cylinder	Axis	Spherical	Cylinder	Axis
Distance						
Near						

Type:

Status:

E) Objective refraction:

GROSS : OD OS **NET :** OD OS

Final power:

Auto Refractometer

OD:

OS:

F) Subjective Refraction:

OD & OS

	OD				OS			
	Spherical	Cylinder	Axis	VA	Spherical	Cylinder	Axis	VA
Distance								
Near								

ADD:

Remarks:

Types of Refractive Error:

	OD	OS
DIAGNOSIS		
Refractive Type		
Clinical Type		

G) Visual acuity with new correction: OD: OS:

a) Prefers new glasses b) Continue same PGP

KERATOMETRY: **OD** **OS**

_____ Vertical

_____ Horizontal

_____ Comments (Manual KR)

COVER TEST: **NPC**: SUBJ & OBJEC:

NPA: OD/OS/OU:

EOM:

WFDT: D **Stereopsis:**

N

PUPILLARY EVALUTION:

EXTERNAL EXAMINATION:

SLIT LAMP EXAMINATION: OD OS

TONOMETRY(mmHg): Method & Time:

GONIOSCOPY:

TBUT: OD: OS**:** **BLINK RATE:**

SCHIRMER'S TEST: OD: OS:

SYRINGING (duct): OD: OS: **ROPLAS**: OD: OS:

DIALATATION INSTRUCTIONS:

FUNDUS: OD OS

DIAGNOSIS:

INTERVENTION PLANNED:

LEARNING:

OTHER PROCEDURE

SUMMARY:

SL NO.	MR NO.	PROCEDURE	INDEPENTED	OBSERVED	CHECK IN	CHECK OUT

Posting: OPTICALS

DISTANCE PD	OD	
	OS	
NEAR PD	OD	
	OS	
EFFECTIVE DIAMETER	OD	
	OS	
FITTING HEIGHT	OD	
	OS	