UNIVERSITY OF CALICUT

B. Voc. Degree Programme in

OPTOMETRY AND OPHTHALMOLOGICAL TECHNIQUES

SCHEME AND SYLLABUS

For General and Skill Papers

2018 ADMISSION ONWARDS

BOARD OF STUDIES IN PHYSICS

CALICUT UNIVERSITY

THENHIPALAM, KERALA, 673 635, INDIA

PREAMBLE

The University Grants Commission (UGC) has launched a scheme on skills development based higher education as part of college/university education, leading to Bachelor of Vocation (B.Voc.) Degree with multiple exits such as Diploma/Advanced Diploma under the NSQF. The B.Voc. programme is focused on universities and colleges providing undergraduate studies which would also incorporate specific job roles and their NOSs alongwith broad based general education. This would enable the graduates completing B.Voc. to make a meaningful participation in accelerating India's economy by gaining appropriate employment, becoming entrepreneurs and creating appropriate knowledge.

The B. Voc. Programme is designed to bridge the potential skill gap identified. The curriculum in each of the years of the programme would be a suitable mix of general education and skill development components. The general education component provides emphasis to Communication skill, Presentation skill, Health and Safety, Industrial Psychology, Environmental awareness, Entrepreneurship development and other relevant subjects in the field. General Education Components should not exceed 40% of the curriculum. Skill Development Component should match the skill gap identified at least 50% of Skill Development Component should be allotted to practical and can grow up to 60% based on the nature of the course. The practical component can be carried out in the college and/or the industry partner premises.

B.Voc. Optometry and Ophthalmological Techniques, is a graduate programme which includes various branches of Applied Physics and Biology. In the present epoch, this course has immense relevance, in the field of education and occupation. The course has been designed to mould the best optometrists. Eyes are the greatest gift of god to human beings. For what the beautiful world would be if one could not see that. Every third blind person is an Indian and there are many others suffering from defective eye problems. Cataract, Diabetic retinopathy and macular degeneration have become common diseases among aged people. Youth also suffer several vision problems. There are many specialty hospitals in Kerala which offer treatment of ophthalmic diseases. Job opportunities for trained optometrists are in plenty in the state.

An effective science education can be imparted at the undergraduate level only by revamping the curriculum according to the needs and developments of the modern society from time to time. To achieve this goal, the curriculum should be restructured by giving emphasis on various aspects such as the creativity of students, knowledge of current developments in the discipline, awareness of environmental impacts due to the development of science and technology, and the skills essential for handling equipments and instruments in laboratories and industries. The units of the syllabus are well defined. The number of contact hours required for each unit is also given. A list of reference books is provided at the end of each course.

AIMS

This curriculum has been prepared with the objective of giving sound knowledge and understanding optometry and ophthalmological techniques to undergraduate students. The goal of the syllabus is to equip students with the potential to contribute to academic and industrial environments. This curriculum will expose students to various fields of optometry and develop interest in related disciplines.

BROAD OBJECTIVE

The B. Voc courses are designed with the following objectives,

- To provide judicious mix of skills relating to a profession and appropriate content of General Education.
- To ensure that the students have adequate knowledge and skills.
- To understand basic facts and concepts in optometry and ophthalmological techniques
- To develop skills in the proper handling of optometric instruments.
- To be exposed to the different processes used in industries and their applications.
- To provide flexibility to the students by means of pre-defined entry and multiple exit points.
- To integrate NSQF within the undergraduate level of higher education in order to enhance employability of the graduates and meet industry requirements. Such graduates apart from meeting the needs of local and national industry are also expected to be equipped to become part of the global workforce.

SEMESTER

A term consisting of 90 working days including examination days distributed over a minimum of 18 weeks of 5 working days consisting of six hours. Total credits in a semester: 30 (equivalent to 450 hours). For final semester internship, the total duration is 900 hours.

ELIGIBILITY AND INDEX CALCULATION

The admission to B Voc programme will be as per the rules and regulations laid out by the University of Calicut for UG admissions. Candidates who have passed pre degree or plus two course(HSE/VHSE/Similar) in any stream with not less than 45% marks in aggregate shall be eligible to apply for admission to the B.Voc Optometry and ophthalmological techniques programme. (No age limit).

Index mark calculation:

Plus two marks (HSE, out of 1200.Other streams should be converted to this appropriately). Additional marks are as follows:

1. 50% of the marks scored (in percentage) for Physics at +2 level
2. 50% of the marks scored (in percentage) for Biology at +2 level
3. 25% of the marks scored (in percentage) for Chemistry/Maths/Computer Science at +2 level
4. +2/ VHSE/ CBSE/ Diploma/ Certificate Course - studied ophthalmology related subjects – 10 marks.
5. NSS-10
6. NCC- as per the A,B,C certificate (5,10,15)

RESERVATION/QUOTA

A maximum of 50 students can be admitted to one B. Voc programme. The students can be admitted only to the first semester (except for diploma holders). No students are admitted directly to the Third and Fifth semester in any circumstance except for diploma holders. Diploma holders may be permitted to third semester directly as mentioned above.

The reservation rules for Government/Aided Colleges are as same as that of the regular UG programmes conducted in colleges affiliated to this university.

LEVELS OF AWARDS

B. Voc is a programme with multiple exits. Following table shows the various certificates and their duration.

Awards	Duration
Diploma	2semester
Advanced diploma	4 Semester
B Voc Degree	6 Semester

ASSESSMENT OF STUDENTS

Assessment of students for each subject will be done by internal continuous assessment and Semester-End examinations. This dual mode assessment will be applicable to both Theory and Practical courses except for internship and project. Total marks in theory course reflect 80 marks external and 20 marks internal assessments. The mark division for practical courses is 20 marks internal and 80 marks external. For internship and project, there is no internal assessment

Sl No	Courses	Internal	External
1	Theory	20	80
2.	Practical	20	80
3.	Internship/ Project	0	100

INTERNAL EVALUATION

20% of the total marks in each course are for internal evaluation. The colleges shall send only the marks obtained for internal examination to the university

The mark distribution to award internal continuous assessment marks for **theory** subject should be as follows:

Assessment	Mark
Test papers (minimum two, best two out of three is preferred)	10
Assignments (minimum two) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.	5
Regularity in the class	5

The mark distribution to award internal continuous assessment marks for **practical** subject should be as follows:

Assessment	Mark
Evaluation in the lab and Rough Record	10
End-semester Test	4
Viva	1
Regularity	5

Note:

No candidate will be permitted to attend the end-semester practical examination unless he/she produces certified record of the laboratory. Full credit for regularity in the class can be given only if the candidate has secured minimum 90% attendance in the subject. Attendance evaluation for each course is as follows

% of attendance	*Marks*
Above 90%	5
85-89%	4
80-84%	3
76-79%	2
75%	1

PATTERN OF QUESTIONS FOR SEMESTER-END EXAMINATIONS

The question papers of Semester-End examinations of theory subjects shall be able to perform achievement testing of the students in an effective manner. Duration of Semester- End examinations will be 3 hours. The pattern of questions for theory subjects shall be as follows:

For Theory

Section	**Total No.of questions**	**No.of question to be answered**	**Marks for each question**	**Total marks**
A:Very short/Objective Type	10	10	1	10
B:Shortanswer type	12	8	2	16
C: Short essay type	9	6	4	24
D: Essay type	4	2	15	30
TOTAL				80

For Practical:

Marks Distribution	**Total marks**
Theory/ Algorithm/Flow diagram	20
Implementation	30
Result/Output	10
Record	10
Viva	10
Total	80

Mark distribution for internship:

Distribution	**Marks**
Content and relevance or Dissertation	60
Viva	20
Presentation	20

GRADING- INDIRECT GRADING SYSTEM

Indirect Grading System based on a 7 point scale is used to evaluate the performance of students.

Marks scored	Grade	Remarks
90 and Above	A+	Outstanding
80 to 89	A	Excellent
70 to 79	B	Very Good
60 to 69	C	Good
50 to 59	D	Satisfactory
40 to 49	E	Adequate
Below 40	F	Failure

CONTENTS

COURSE STRUCTURE

CREDIT DISTRIBUTION

Semester	Common Course		General Component	Skill Component	Total
	English	Additional Language			
I	4	4	4	4+4+5+5=18	30
II	4	4	4	4+5+5+4=18	30
III	4	-	4+4=8	4+4+4+6=18	30
IV	4	-	4+4=8	4+5+5+4=18	30
V	-	-	4	4+4+4+4+6+4=26	30
VI	-	-	-	30	30
Total	**16**	**8**	**28**	**128**	**180**

DETAILED CURRICULUM

SEMESTER I									
C.No	**Course Code**	**Course Name**	**Credit**	**Marks**			**Hrs/wk**		
				Int	**Ext**	**Tot**	**T**	**P**	**Total**
1.1	GEC1EG01	AO1 Transactions Essential English Language Skills	4	20	80	100	4		4
1.2	GEC1ML02 GEC1AR02 GEC1HD02	MAL1A01(2) Malayalam Bhashayum Sahithyavum-I ARB1A07(1) -Communication Skills in Arabic A07(3) Prose and one act plays	4	20	80	100	4		4
1.3	GEC1GA03	General Anatomy & Physiology	4	20	80	100	4		4
1.4	SDC1PO01	Physical Optics	4	20	80	100	4		4
1.5	SDC1MP02	Microbiology & Pharmacology	4	20	80	100	4		4
1.6	SDC1GA03 (P)	General Anatomy & Physiology-Practical	5	20	80	100		5	5
1.7	SDC1MP04 (P)	Microbiology & Pharmacology - Practical	5	20	80	100		5	5
Semester I Total			**30**			**700**	**20**	**10**	**30**

SEMESTER II									
C.No	**Course Code**	**Course Name**	**Credit**	**Marks**			**Hrs/wk**		
				Int	**Ext**	**Tot**	**T**	**P**	**Total**
2.1	GEC2EG01	A02 Ways with Words	4	20	80	100	4		4
2.2	GEC2ML02 GEC2AR02 GEC2HD02	MAL2A02 (2) Malayalam- Bhashayum Sahithyavum-II ARB2A08(1)– Literature in Arabic A09 Poetry and Short Stories	4	20	80	100	4		4
2.3	GEC2OA03	Ocular Anatomy & Physiology	4	20	80	100	4		4
2.4	SDC2GO01	Geometrical Optics	4	20	80	100	4		4
2.5	SDC2BC02	Biochemistry	5	20	80	100	5		5
2.6	SDC2OA03 (P)	Ocular Anatomy & Physiology-Practical	5	20	80	100		5	5
2.7	SDC2INT04 (Pr)	Internship/Project	4	0	100	100		4	4
Semester II Total			**30**			**700**	**21**	**9**	**30**

SEMESTER III									
C.No	**Course Code**	**Course Name**	**Credit**	**Marks**			**Hrs/wk**		
				Int	**Ext**	**Tot**	**T**	**P**	**Total**
3.1	GEC3EG01	A03 Writing for academic & professional success	4	20	80	100	4		4
3.2	GEC3OD02	Ocular Disease	4	20	80	100	4		4
3.3	GEC3CR03	Clinical Refraction	4	20	80	100	4		4
3.4	SDC3PI01	Pathology & Immunology (General & Ocular)	4	20	80	100	4		4
3.5	SDC3OI02	Ophthalmic Instrumentation & Procedure	4	20	80	100	4		4
3.6	SDC3PI03 (P)	Pathology & Immunology –Practical	4	20	80	100		4	4
3.7	SDC3OI04 (P)	Ophthalmic Instrumentation-Practical	6	20	80	100		6	6
Semester III Total			**30**			**700**	**20**	**10**	**30**
SEMESTER IV									
C.No	**Course Code**	**Course Name**	**Credit**	**Marks**			**Hrs/wk**		
				Int	**Ext**	**Tot**	**T**	**P**	**Total**
4.1	GEC4EG01	AO4 Zeitgeist : Readings on society and cultures	4	20	80	100	4		4
4.2	GEC4ES02	(EWM1B01) Environmental Science	4	20	80	100	4		4
4.3	GEC4CO03	Community Optometry	4	20	80	100	4		4
4.4	SDC4VO01	Visual Optics	4	20	80	100	4		4
4.5	SDC4DO02	Dispensing Optics	5	20	80	100	5		5
4.6	SDC4DO03(P)	Dispensing Optics-Practical	5	20	80	100		5	5
4.7	SDC4INT04(Pr)	Internship/ Project	4	0	100	100		4	4
Semester IV Total			**30**			**700**	**21**	**9**	**30**

Qualification Pack-HSS/Q3001- Vision Technician.

SEMESTER V									
C.No	**Course Code**	**Course Name**	**Credit**	**Marks**			**Hrs/wk**		
				Int	**Ext**	**Tot**	**T**	**P**	**Total**
5.1	GEC5NU01	Nutrition	4	20	80	100	4		4
5.2	SDC5GP01	Geriatric & Pediatric Optometry	4	20	80	100	4		4
5.3	SDC5CL02	Contact Lens	4	20	80	100	4		4
5.4	SDC5BV03	Binocular Vision	4	20	80	100	4		4
5.5	SDC5LV04	Low Vision Aid & Visual Rehabilitation	4	20	80	100	4		4
5.6	SDC5CLBV05 (P)	Contact Lens & Binocular Vision-Practical	6	20	80	100		6	6
5.7	SDC5LVGP06 (P)	Low Vision & Geriatric Pediatric Optometry –Practical	4	20	80	100		4	4
Semester III Total			**30**			**700**	**20**	**10**	**30**
SEMESTER VI									
C.No	**Course Code**	**Course Name**	**Credit**	**Marks**			**Hrs/wk**		
				Int	**Ext**	**Tot**	**T**	**P**	**Tot**
6.1	SDC6INT01 (Pr)	Major Internship (900 hrs.)	30	0	100	100		900	900
Semester VI Total			**30**			**100**			**900**
Grant Total			**180**			**3600**			

SEMESTER-I

GEC1GA03 - General Anatomy & Physiology

Course No: 1.3

Course Code: GEC1GA03

Course Name: General Anatomy & Physiology

Credits: 4

Hours: 65

Unit: 1

GENERAL ANATOMY: Introduction to Human Anatomy: Anatomy: Definition and its relevance in medicine and optometry - Planes of the body, relationship of structures, organ system, Skeleton System Tissues of the Body: Epithelium, connective tissue, bone and cartilage, Embryology, histology, different types of each of them, types of cells, cellular differentiation and arrangements in different tissues Muscles: Different types of muscles, their functional differentiation, their relationship with different structures, and their neural supply Blood vessels: Differentiation between arteries and veins, embryology, histology of both arteries and veins, Functional differences between the two, anatomical differences at different locations

Unit: 2

SKIN AND APPENDAGES: Embryology, anatomical differences in different areas, functional and protective variations, innervations, relationship with muscles and nerves Lymphatic system: Embryology, functions, relationship with blood vessels and organs Glands: Embryology, different types of glands (exocrine and endocrine), functional differences, neural control of glands.

NERVOUS SYSTEM: Parts of Nervous system, cell types of nervous system, Blood-brain barrier, Reflex arc, Peripheral Nerves, Spinal nerves, Nerve fibers, Autonomic Nervous system Brain and Cranial nerves: Major parts of Brain, Protective coverings of the Brain, Cerebrospinal Fluid, Brain stem, Cerebellum, Diencephalon, Cerebrum, Cranial nerves

Unit: 3

GENERAL PHYSIOLOGY-Cell structure & organization, Tissue organization, Epithelium Connective tissue – Collagen fibers – Elastic fibers – Areolar fibers Cartilage – Bone, Contractile tissue – striated – skeletal – cardiac – non striated – plain – myoepithelial - General principles of cell physiology, Physiology of skeletal muscle

BLOOD: Composition, Volume measurement & variations, Plasma proteins – classification & fonctions Red blood cells – development, morphology & measurements – functions & dysfunctions. White blood cells – development – classification, morphology – functions & dysfunctions Platelets – morphology – development, functions & dysfunctions, Clotting – factors – mechanism – anti- coagulants dysfunctions, Blood grouping – classification – importance in transfusion, Rh factor & incompatibility, Suspension stability

DIGESTION: General arrangement : Salivary digestion – functions & regulations, Gastric digestion – functions & regulations, Pancreatic digestion – functions & regulations, Intestinal digestion – functions & regulations, Liver & bile, Absorption, Motility, Deglutition, Vomiting, Defecation, Functions of large intestine, Neurohumoral

regulations of alimentary functions, summary

Unit: 4

EXCRETION: Body fluids – distribution, measurement & exchange, Kidney – structure of nephron – mechanism of urine formation – composition of the urine and abnormal constituents – urinary bladder & micturition

ENDOCRINES: Hormone mechanism – negative feed backs – tropic action – permissive action – cellular action, hypothalamic regulation Thyroid - hormones, actions, regulations Adrenal cortex - hormones, actions, regulations Adrenal medulla – hormones, actions, regulations Parathyroid - hormones, actions, regulations Islets of pancreas – hormones, actions, regulations Miscellaneous _ hormones, actions, regulations Common clinical disorders

Unit: 5

REPRODUCTION: Male reproductive system – control & regulation , Female reproductive system – uterus – ovaries – menstrual cycle – regulation – pregnancy & delivery – breast – family planning

Respiration: Mechanics of respiration – pulmonary function tests – transport of respiratory gases- neural and chemical regulation of respiration – hypoxia, cyanosis, dyspnoea – asphyxia.

CIRCULATION: General principles Heart: myocardium – innervations – transmission of cardiac impulse- Events during cardiac cycle – cardiac output. Peripheral circulation: peripheral resistances – arterial blood pressure – measurements – factors regulation variations – capillary circulation – venous circulation. Special circulation: coronary cerebral – miscellaneous - Environmental Physiology, Body temperature regulation (including skin Physiology). Exposure to low and high atmospheric pressure

NERVOUS SYSTEM: Neuron – Conduction of impulse – synapse – receptor. Sensory organization – pathways and perception - Reflexes – cerebral cortex – functions. Thalamus – Basal ganglia, Cerebellum., Hypothalamus. - Autonomic nervous system – motor control of movements, posture and equilibrium – conditioned reflex, eye hand co-ordination, Special senses – (Elementary) Olfaction – Taste – Hearing

Texts Books:

1. B D Chaurasia: Handbook of general Anatomy, Third edition, CBS Publishers, New Delhi, 1996

2. GJ Tortora, B Derrickson: Principles of Anatomy and Physiology,11th edition,John Wiley & Sons Inc, 2007

3. John Wiley & Sons Inc, New Jersey, 2007

Reference Books:

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

2. A C Guyton: Text book of Medical Physiology, 6th edition, saunders company, Japan, 1981.

SDC1PO01– Physical Optics

Course No: 1.4

Course Code: SDC1PO01

Course Name: Physical Optics

Credits: 4

Hours: 65

Unit-1:
Dual nature of light- Simple harmonic motion- differential; Simple harmonic waves-mathematical representation; Super position of simple harmonic waves.

Unit-2:
HUYGENS' Principle – Laws of reflection and refraction at plane and spherical surfaces. Wave velocity group velocity; determination of velocity of light (any one method.)

Unit-3:
Interference: Coherence; path and phase difference; Theory of interference fringes intensity distribution infringes; Young's double slit experiment- Fresnels' biprism, Lloyds' mirror experiments; visibility of fringes. Interference in thin films due to reflected and transmuted light- Interference in wedge Shaped films; Newton's ring experiment ; Color of thin films; Thin film antireflection coating and filters.

Unit-4:
Diffraction: Diffraction by single slit; double slit, multiple slit- grating, circular aperture – amplitude & intensity distribution (final expressions only). Circular aperture- airy pattern, resolution by circular apertures. Diffraction grating- reflection, transmission, amplitude & phase gratings (definitions in brief) Grating dispersion & dispersive power, spectral resolution; zone plates.

Unit-5:
Polarization & Crystal Optics: Concept of polarization , linear , circular , elliptical polarization (qualitatively), Plane of polarization & vibration, degree of polarization, polarizes, analyzers, Production of polarized light, birefringence, calculate crystal , veal prism, Wallaston prism , retarders - full, half & quarter wave plates, analysis of light of unknown Polarization. Linear Scattering- Raleigh & Mce

Unit-6:
Principles of LASERs, Holography – basic principle; simple experimental arrangement, some applications

Textbooks:

1. Subrahmanyan.N, BrijLal, *A textbook of Optics*, S.Chand.Co Ltd, New Delhi, India,2003.
2. Pedrotti L. S, Pedrotti Sr. F. L, *Optics and Vision*, Prentice Hall, New Jersey, USA, 1998.

3. **Reference Books:**

1. PedrottiL.S, PedrottiSr.F.L, *Optics and Vision*, Prentice Hall, New Jersey, USA, 1998.
2. Keating NM. P, *Geometric, Physical and Visual Optics*, Butterworth- Heinemann, Massachusetts, USA, 2002.
3. Loshin D. S. *The Geometric Optics Workbook*, Butterworth-Heinemann, Boston, USA, 1991.
4. Schwartz S. H. *Geometrical and Visual Optics: A Clinical Introduction*, McGraw-Hill,

New York, USA, 2002.
5.Tunnacliffe A. H, Hirst J. G, *Optics*, The association of British Dispensing Opticians, London, U.K., 1990.

SDC1MP02 – Microbiology & Pharmacology

Course No: 2.5

Course Code: SDC1MP02

Course Name: Microbiology & Pharmacology

Credits: 4

Hours: 65

Unit :1

Introduction to Microbiology; Types of Micro organism bacteria : cell structure, element idea about classification and morphological basis. Staining reaction: Gram staining, acid fast staining, Bacterial growth: nutritional requirements, Physical factors Effecting culture media and growth curve.

Sterilization and disinfection in the laboratory. Antibiotic: Bacteriostatic and bactericidal effects.

Unit:2

Micro Vs Humans,The development of infection, the disease process, Pathogenicity and virulence- Ocular Bacteriology- Gram Positive (Staphylococcus aureus,Staphylococcus epidermidis,Streptococcus Propionibacterium, actinomyceses,nocardia)Pneumococcus.Bactetria including acid fast bacilli (mycobacterium tuberculosis,mycobacterium leparae)

Unit:3

Ocular Bacteriology:- Gram negative Bacteria (Pseudomonas,Heamophilous,Brucella,neisseria,morazella) Spirochetes (Treponema,,Leptospiraccae)

Unit:4

Virology:- Classification of viruses in ocular disease, Rubella, Adenovirus, Oncogenic viruses(HPV, HBV, Retrovirus), HIV

Fungi-yeast, Filamentous, Dimorphic – intracellular parasites – Chlamydia,protozoa(taxoplasmosis,acanthamoeba),heliminthus(toxocariasis,filariasis,onchocerciasis,trematodes)

Unit:5

Various methods of administration of drugs in ophthalmology-topical drugs used for mydriatis / miotics-antibiotic-fortified drops-anesthetics-systemic drugs in glaucoma-miscellaneous drugs –lubricants-steroids

Text Book

1) BURTON G.R.W: Microbiology for the Health Sciences,3rd edition, J.P Lippincott Co.,St.Louis,1988

2) M J Pelczar (Jr),ECS Chan , NR Krieg:Microbiology,5th edition,TATA McGRAW-HILL Publisher,New Delhi,1993

3) KD TRITATHI-Essentials of Medical Pharmacology,7th edition,J P Brothers Medical Publishers (P)Ltd,2013

SDC1GA03 (P) – General Anatomy& Physiology- Practical

Course No: 1.6

Course Code: SDC1GA03 (P)

Course Name:General Anatomy & Physiology Practical

Credits: 5

Hours: 75

1. Identification of skull & skeleton (bones) [Skull-bones comprising, base of skull orbits]
2. Identification of organs & viscera
3. Identification of histological tissues.

a) Epithelial tissue-squamous, columnar, cuboidal

b) Connective tissue-skeletal muscle, cardiac muscle, smooth muscle

4. Identification of fixed histological slides – nerve tissues (cerebellum, cerebral cortex, neurons, spinal cord, nodes of Ranvier, corneal cell space), renal tissues, Blood vessels (artery & vein), Skin, Tongue, Liver.
5. Hemoglobin estimation
6. Determination of blood pressure

SDC1MP04 (P) –Microbiology & Pharmacology –Practical

Course No: 1.7

Course Code: SDC1MP04 (P)

Course Name: Microbiology & Pharmacology –Practical

Credits: 5

Hours: 75

1. Good microbiological laboratory practices
2. Sterilization and disinfectants
3. Slide Identification of bacteria's & pathogens.
4. Preparation of common stains used in microbiology & pathology (Eosin Haematoxylin Leishmann Stain etc.)-
5. Staining –Gram staining, Acid Fast staining
6. Preparations of culture media
7. Spread plate and pour plate
8. Preparing serial dilution
9. Antibiotic Sensitivity test by Kirby Bauer method

SEMESTER-II

GEC2OA03– Ocular Anatomy & Physiology

Course No: 2.3

Course Code: GEC2OA03

Course Name: Ocular Anatomy & Physiology.

Credits: 4

Hours: 65

Unit: 1

Anatomy: Cornea: Anatomy of all the layers, cellular structure, nerve supply, reason for transparency, refractive properties

Coats of eyeball: Sclera (episclera & sclera), Uvea (Iris, ciliary body, choroid), Retina Detailed anatomy, cellular structure, vasculature, nerve supply for all the above coats, pupils, nerve supply for pupillary actions, pupillary pathway. Crystalline lens, Aqueous, anterior chamber, vitreous body

Unit: 2

Brief ocular Embryology,orbit Ocular Adnexa and Lacrimal system, Extra ocular muscles (anatomy, innervations, action) Orbital Blood supply

Unit: 3

Cranial Nerves: Study of each of the following nerves in terms of their nucluei , course, relationship within brain, effects of compression etc at different regions Optic nerve Oculomotor nerve Trochlear nerve Trigeminal nerve Abducent nerve Facial nerve Visual Pathway, Autonomic Innervations of Ocular structures

Unit: 4

Physiology: Protective mechanisms in the eye, Precorneal tear film, eyelids and lacrimation Extrinsic Ocular muscles, their actions and control of their movements Saccadic, smooth pursuit and Nystagmic eye movements Coats of the eye ball Corneal Physiology Aqueous humor and vitreous: Intra ocular pressure Iris and pupil

Unit: 5

Crystalline lens and accommodation, Retinal structure and functions, dark and Light Adaptations

Unit: 6

Anatomy of Extra Ocular Muscles.-Rectii and Obliques, LPS. Innervation & Blood Supply. Physiology of Ocular movements. Center of rotation, Axes of Fick. Action of individual muscle.Sherrington’s law, Herring’s law

Text Book:

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

Reference Books:

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

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

SDC2GO01– Geometrical Optics

Course No: 2.4

Course Code: SDC2GO01

Course Name: Geometrical Optics

Credits: 4

Hours: 65

Unit-1:
What is light- dual nature- particle & wave nature, speed, wave length & frequency of light.
Unit-2:
Fermats' principle- laws of relation & refraction at a plane surface using Fermats' principle.
Unit-3:
Snells' law, relative and absolute refractive indices, total internal reflection and Critical angle, refraction by plane parallel slab of glass; molecular basis of reflectively (basic index).
Unit-4:
Geometrical path length & optical path length of rays, Concept of wave fronts & rays, concept of divergence and convergence.
Unit-5:
Refraction by spherical surfaces- convex & concave, Derivation of vergence equation, focal points, deportee power, image point, lateral & axial magnification, simple numerical.
Unit-6:
Thin Lens- shapes, derivation of lens makers' formula, thin lens vergece equation, equivalent focal length of two thin lenses separated by a distance & placed in contact, lateral magnification of thin lenses in contact, simple numerical, concept of reduced systems.
Unit-7:
Thick Lens- Cardinal points & planes, front & back vertex power, matrix theory in paraxial Optics to locate positions of cardinal planes. Different types of aberrations & their effects.
Unit-8:
Prism- Dispersion of prism, reflecting prisms, prisms diopters.
Unit-9:
Geometrical theory of optical fibers. Uses of optical fibers.

Textbooks:
1. Subrahmanyan.N, BrijLal, A Textbook of Optics, S.Chand.Co Ltd, New Delhi, India,2003.
Reference Books:
2. Keating NM. P, Geometric, Physical and Visual Optics, Butterworth- Heinemann,

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

SDC2BC02– Biochemistry

Course No: 2.5

Course Code: SDC2BC02

Course Name: Biochemistry

Credits: 5

Hours: 75

Unit-1:
Carbohydrates: Glucose; fructose; galactose; lactose; sucrose; starch and glycogen (properties and tests, Structure and function), Proteins: Amino acids, peptides and proteins (general properties & tests with a few examples like glycine, tryptophan, glutathione, albumin, hemoglobin and collagen). Lipids: Fatty acids, saturated and unsaturated, cholesterol and triacylglycerol, phospholipids and plasma membrane

Unit-2:
Vitamins: General with emphasis on A, B2, C, E and inositol (requirements, assimilation and properties), Minerals: Na, K, Ca, P, Fe, Cu and Se. (requirements, availability and properties) Hormones:Hormones and their receptors basic concepts in metabolic regulation with examples, insulin, glucagon and thyroxin. Metabolism: General whole body metabolism (carbohydrates, proteins, lipids)

Unit-3:
Ocular Biochemistry: Various aspects of the eye, viz. tears, cornea, lens, aqueous, vitreous, retina and pigment epithelium rhodopsin. (The important chemicals in each and their roles).
Clinical Biochemistry: Blood sugar, urea, creatinine and Bilirubin, cholesterol etc. and significance of their estimation.

Textbook:
1. S. Ramakrishnan, Essentials of biochemistry and ocular biochemistry, Annamalai UniversityPublications, Chidambaram, India, 1992

Reference Book:
1. S. Ramakrishnan, KG Prasannan and R Rajan: Textbook of Medical Biochemistry, Orient Longman, Madras,1990.
2. D.R. Whikehart Biochemistry of the Eye, 2nd edition, Butterworth Heinemann, Pennsylvania,2003

SDC2OA03 (P) – Ocular Anatomy & Physiology-Practical

Course No: 2.6

Course Code: SDC2OA03 (P)

Course Name: Ocular Anatomy & Physiology-Practical

Credits: 5

Hours: 75

Identify the structure and explain its layers & functions/ significant;

1. Cornea
2. Conjunctiva
3. Sclera
4. Iris
5. Choroid
6. Crystalline lens
7. Retina
8. Optic Nerve
9. Rods and Cones
10. Visual Pathway- O.N, Optic Chiasma,Optic Tract, Lateral Geniculate Body, Optic Radiations

Identify the Adaptation system and explain;

1. Light Adaptation
2. Dark Adaptation

SDC2INT04 (Pr) – Internship/ Project

Course No: 2.7

Course Code: SDC2INT04 (Pr)

Course Name: Internship/ Project

Credits: 4

Hours: 65

A candidate has to undergo internship either in optometric/ophthalmological industries or hospitals such as, Govt. hospital / medical colleges/ private hospital/, which fulfill the norms decided by the University.
The major idea for internship is to implement the things learned and to get a real life experience.

Every student will be assigned an internal guide, allotted from the parent department concerned or an expert available in the college appointed by the principal or the head of the department. The student has to make regular discussions with the guide while choosing the subject/area and throughout the life time of the project.

SEMESTER-III

GEC3OD02 – Ocular Disease

Course No: 3.2

Course Code: GEC3OD02

Course Name: Ocular Disease

Credits: 4

Hours: 60

Unit-1.
Anterior segment ocular diseases involving orbit, eyelids, adnexa, conjunctiva, cornea, urea, sclera, anterior chamber, iris and lens. Symptomatology, clinical signs, diagnosis, pathogenesis, pathophysiology , systemic disease relationships and treatment of degenerative, infections and inflammatory conditions affecting these structures.

Unit-2.
Disease of the Lids – Congenital Deformities of the Lids . Oedema of the Lids. Inflammatory Conditions of the Lids. Deformities of the Lid Margins. Deranged Movement of the Eyelids. Neoplasm's of the Lids. Injuries of the Lids.

Unit-3.
Diseases of the Lacrimal Apparatus-. Dry Eye. Disease of the Lachrymal Gland. Disease of the Lachrymal Passages. Operations for Chronic Dacryocystitis.

Unit-4.
Disease of the Conjunctiva- Subconjunctival Haemorrhage Infective Conjunctivitis. Follicular Conjunctivitis. Granulomatous Conjunctivitis. Allergic Conjunctivitis. Conjunctivitis Associated with Skin conditions. Degenerative conditions of the Conjunctiva. Vitamin- A Deficiency. Cysts and Tumours of the Conjunctiva. Conjunctival Pigmentation. Injuries of the Conjunctiva.

Unit-5.
Disease of the Cornea –Congenital Anomalies. Inflammation of the Cornea (Keratitis). Superficial Keratitis. Deep Keratitis. Vascularisation of Cornea. Opacities of the Cornea. Keratoplasty. Corneal Degenerations. Corneal Dystrophy's. Corneal Pigmentation. Corneal Injuries. Refractive Corneal Surgery. Corneal Ulcer (Bacterial, Viral , Fungal)

Unit-6.
Disease of the Sclera- Episcleritis. Scleritis. Staphyloma of the Sclera. Blue Sclerotic Scleromalacia Performs. Nanophthalmos. Injuries of the Sclera.

Unit-7.
Disease of the Iris.-. Congenital Anomalies. Inflammations (Anterior Uveitis) . Specific Types of Iriodocyclitis . Degenerations of the Iris. Cysts and Tumours of the Iris. Injuries of the Iris.

Unit-8.
Disease of the Ciliary Body- Inflammations of the Ciliary Body. Purulent Iriodocyclitis (Panophthalmitis) . Evisceration. Sympathetic Opthalmia. Vogt- Koyanagi – Harada Syndrome. Tumours of the Celery body. Injuries of the Celery body.

Unit-9.
Disease of the Lens- Congenital Malformations. Cataract . Congenital and Developmental Cataract . Senile Cataract. Traumatic Cataract. Complicated Cataract. Secondary Cataract. After Cataract. Dislocation of the Lens. SurgicalProcedures for Removal of the Lens

(Operative Steps Only). Phacoemulsification (ICCE, ECCE, IOL). Small Incision Cataract Surgery (Manual Phaco).Intraocular Lens Implantation-AC+PC, IOL.

Unit-10.

Retinal Artery Occlusion-CRAO,CRBO,Retinal Vein Occlusion-CRVO,BRVO,Hypertensive retinopathy,Diabetic Retinopathy,Retinopathy of Prematuarity,,Retinitis Pigmentosa,Central serous Chorioretinopathy,Cystoid Macular Eodema,ARMD,,Retinal Detachment,Retinoblastoma

Unit-11.

Glaucoma- .Formation of Aqueous Humor. Drainage of Aqueous. Intraocular Pressure(IOP) .Ocular Rigidity.Tonography. Developmental Glaucoma (Buphthalmos) . Primary Narrow Angle Glaucoma. Primary Open Angle Glaucoma. Normotensive Glaucoma . Ocular Hypertension . Secondary Glaucoma. Surgical Procedures for Glaucoma (Steps Only) ,YagPI ,trabeculectomy. Laser Procedure in Glaucoma . Artificial Drainage Devices in Glaucoma Surgery(Molteno).

Text Book

AK Khurana: Comprehensive Ophthalmology, sixth edition, JP Publishers, New Delhi, 2015

Reference Books

Jack j. Kanski: Clinical Ophthalmology,2003, Butterworths.

GEC3CR03 – Clinical Refraction

Course No: 3.3

Course Code: GEC3CR03

Course Name: Clinical Refraction

Credits: 4

Hours: 60

Unit: 1

Review of Geometrical Optics

Conjugacy, object space and image space. Sign convention Spherical refracting surface, Spherical mirror; catoptric power, Cardinal points, Clinical Relevance of: Fluorescence, Interference, Diffraction, Polarization application, Spherical and Chromatic

Unit: 2

Optics of Ocular Structure

Cornea and aqueous Crystalline lens Vitreous Schematic and reduced eye

Unit: 3

Measurements of Optical Constants of The Eye, Corneal curvature and thickness Keratometry 3.3 Curvature of the lens and ophthalmophakometry, Angles and axes of the eye.

Unit: 4

Visual Acuity, Light and Dark Adaptation, Color Vision, Spatial and Temporal Resolution.

Unit: 5

Refractive Anomalies and their Causes

Etiology of refractive anomalies, Optical component measurements, Growth of the eye in relation to refractive errors

Text books:

1. A K Khurana: Theory & Practice of Optics & Refraction,4th Edition,Elsevier Publications,2006.

Reference Books:

1. M P Keating: Geometric, Physical and Visual optics, 2nd edition, Butterworth-Heinemann, USA, 2002
2. HL Rubin: Optics for clinicians, 2nd edition, Triad publishing company. Florida, 1974.
3. H Obstfeld: Optic in Vision- Foundations of visual optics & associated computations, 2nd edition, Butterworth, UK, 1982.
4. WJ Benjamin: Borish's clinical refraction,2nd edition, Butterworth Heinemann, Missouri, USA,2006
5. T Grosvenor: Primary Care Optometry,4th edition, Butterworth – heinneman,USA,2002.
6. A H Tunnacliffe: Visual optics, The Association of British Optician, 1987
7. AG Bennett & RB Rabbets: Clinical Visual optics, 3rd edition, Butterworth Heinemann, 1998.

SDC3PI01 – Pathology & Immunology (General & Ocular)

Course No: 3.4

Course Code: SDC3PI01

Course Name: Pathology & Immunology (General & Ocular)

Credits: 4

Hours: 60.

Unit:1

General Pathology: Principles, Pathology of cornea and conjunctiva, Pathology of eyelids and adnexa

Unit:2

Brief Pathology of Uvea, lens, glaucoma, Retina, retina in systemic disease / disorders, Retinoblastoma ,Optic nerve, Pathology of Orbital spaces occupying lesions

Unit:3

Structure and function of immune system – structure and function of thymus, spleen and red bone narrow- immunity and its types, plasma protection and immune reaction, cell involved in immune system humoral immunity ,theories of antibodies formation

Unit:4

Structure and function of lymph nodes. No specific immunity, antibody mediated immunity, specific immunity, cell modified immunity, Active immunity, Passive immunity.

Unit:5

Source of infection: Transmission of organism to the body, wound infections. Wound healing. Immuno-pathogenesis – types I, II, III, IV hypersensitivity. Mechanism of auto immunity. Organ specific and no-organ specific auto immune disease. The HLA system histocompatibility complex.

.Unit: 6

Pyogenic and bacterial infection

Graft rejection basic outline.

Disorder of growth – metaphase, dysplasia, neoplasia. Circulatory disturbances-

thrombosis infraction, ischemia, embolism, degeneration (calcification).

Text Book:

1)KS Ratnagar: Pathology of the Eye & Orbit,JayPee brothers Medical Publishers,1997.

2) Thomas J Kindt,Richard A Goldsby,Barbara A Osborne:KUBY IMMUNOLOGY,6th Edition,W H Freeman & Company,2007

Reference :

1)CORTON KUMAR & ROBINS: Pathological Basis Of The Disease,7th Edition,Elsevier,New Delhi ,2004

SDC3OI02 – Ophthalmic Instrumentation & Procedure

Course No: 3.5

Course Code SDC3OI02

Course Name: Ophthalmic Instrumentation & Procedure

Credits: 4

Hours: 60

Unit-1

Trial Set and Trail frame, , Standard Tests Charts, Retinoscopes-types and procedure. Telescopes and types. Simple and Compound Microscopes, Spectrometer.

Unit 2

Autorefractometer- subjective and objective types,
Opthalmoscopes- Direct and Indirect types.

Unit 3

Slit lamp Biomicroscope, Tonometer, Keratometer, Lensometer, Trial frame design.

Unit 4:

Synsaptophore,A scan,ERG,Perimetry,Corneal Topography.

Text Book:

1. AK Khurana: Theory & Practice of Optics & Refraction,4th Edition,Elsevier Publications,2006.

Reference:

1. Introduction to Visual Optics, Alan H. Tunacliffe(1987)
2. Clinical Optics- 2nd ed (1991)- A.R. Elington & H.J. Frank
3. Optics & Refraction-L.P. Agarwal.
4. Clinical Optics- Borrish.

SDC3PI03 (P) Pathology & Immunology –Practical

Course No: 3.6

Course Code: SDC3PI03 (P)

Course Name: Pathology & Immunology –Practical

Credits: 4

Hours: 60

1. Gram Staining of bacteria
2. Slide Identification of non virulent bacteria's & pathogens.
3. Preparation of common stains used in microbiology & Pathology (Eosin Haematoxylin Leishmann Stain etc.)- (Demonstration).
4. Determination of BT, CT, ESR
5. Measurement of TC of RBC & WBC & DC of WBC.
6. Determination of Blood Group (ABO; Rh).

SDC3OI04 (P) – Ophthalmic instrumentation-Practical

Course No: 3.7

Course Code: SDC3OI04 (P)

Course Name: Ophthalmic instrumentation-Practical

Credits: 6

Hours: 90

To study the operations of the following instruments: -

1. Focimeter or Lensometer.
2. Retinoscope.
3. Standard Test Charts.
4. Autorefractometer.
5. Slit Lamp Examination.
6. Keratometer.
7. Opthalmoscope.
8. Tonometer
9. A scan & B scan
10. HFA

SEMESTER-IV

GEC4ES02 – (EWM1B01) Environmental Science

Course No: 4.2

Course Code: GEC4ES02

Course Name: Environmental Science

Credits: 4

Hours: 60

Unit 1

Multidisciplinary nature of environmental studies, Definition, scope and importance, Need for public awareness.

Unit 2

Natural Resources: Renewable and non-renewable resources: Natural resources and associated problems. Forest resources: Use and over-exploitation, deforestation, case studies. Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems. Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies. Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Case studies. Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources.

Unit 3

Ecosystems: Concept of an ecosystem. Structure and function of an ecosystem. Producers, consumers and decomposers. Energy flow in the ecosystem. Ecological succession. Food chains, food webs and ecological pyramids. Introduction, types, characteristic features, structure and function of Forest ecosystem , Grassland ecosystem Desert ecosystem Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Unit 4

Biodiversity and its conservation: Introduction – Definition: genetic, species and ecosystem diversity. Biogeographical classification of India Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values Biodiversity at global, National and local levels. India as a mega-diversity nation, Hot-sports of biodiversity. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. Endangered and endemic species of India, Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

Unit 5

Environmental Pollution: Definition, Cause, effects and control measures of various pollutions Solid waste Management: Causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution. Social Issues and the environment. Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Environment Protection Act. Public awareness, Human Population and the Environment, Role of Information Technology in Environment and human health.

References:
R Rajagopalan, Environmental Studies
B. B. Singh, Objective Environmental Sciences

GEC4CO03–Community Optometry

Course No: 4.3

Course Code: GEC4CO03

Course Name: Community Optometry

Credits: 4

Hours: 60

Unit-1:
Concept of public health.
Unit-2:
Principles of primary, secondary and tertiary care.
Unit-3:
Planning of health services.
Unit-4:
Health economics
Unit-5:
Health manpower development-a)Basic O.T Practices b) Familiarity with use of Operating Microscope
Unit-6:
NPCB and refractive blindness – optometrist's role as primary health care provides.
Unit-7:
Health care insurance including role of TPA.
Unit-8:
Ocular emergencies –Foreign body, Eye Pain,Watering, Injuries-perforating, non perforating & chemical

Reference Books:
1.Mausne & Bahn: Epidemiology- An Introductory text, 2nd Ed
2.Community Health Nursing by K.Park, Latest Edition, Banarsidas
3.Basic Epidemiology by R.Beaglehole R.Bonita and T.Kjellstrom. Orient Longman WHO Geneva

SDC4VO01– Visual Optics

Course No: 4.4

Course Code: SDC4VO01

Course Name: Visual Optics

Credits: 4

Hours: 60

Unit:1
Refractive conditions
Emmetropia
Myopia
Hyperopia
Astigmatism
Accommodation
Presbyopia
Anisometropia and Aniseikonia
Aphakia and Pseudophakia
Unit: 2
Accommodation
Far and near points of accommodation
Correction of spherical ametropia
Axial versus refractive ametropia
Relationship between accommodation and convergence, AC / A ratio.
Unit: 3
Objective refraction
Streak Retinoscopy only
Unit: 4
Subjective Refraction
Review of subjective refractive methods
Cross cylinder methods for astigmatism, Astigmatic Fan Test
Difficulties in subjective and objective tests and their avoidance
Ocular refraction versus spectacle refraction
Unit: 5
Subjective Refraction
Ocular accommodation versus spectacle accommodation
Spectacle magnification and relative spectacle magnification
Retinal image blur; depth of focus and depth of field
Prescribing Prisms / Binocular Refraction

Text books:

1. 1. A K Khurana: Theory & Practice of Optics & Refraction,4th Edition,Elsevier Publications,2006.

Reference Books:

1. HL Rubin: Optics for clinicians, 2nd edition, Triad publishing company. Florida,

1974.
2. H Obstfeld: Optic in Vision- Foundations of visual optics & associated computations, 2nd edition, Butterworth, UK, 1982.
3. WJ Benjamin: Borish's clinical refraction,2nd edition, Butterworth Heinemann, Missouri, USA,2006
4. T Grosvenor: Primary Care Optometry,4th edition, Butterworth – heinneman,USA,2002.
5. A H Tunnacliffe: Visual optics, The Association of British Optician, 1987
6. AG Bennett & RB Rabbets: Clinical Visual optics, 3rd edition, Butterworth Heinemann, 1998.
7. M P Keating: Geometric, Physical and Visual optics, 2nd edition, Butterworth-Heinemann, USA, 2002

SDC4DO02–Dispensing Optics

Course No: 4.5

Course Code: SDC4DO02

Course Name: Dispensing Optics

Credits: 5

Hours: 75

UNIT-1 OPHTHALMIC LENS:

Unit-1.1

Characteristics of lenses: Introduction. Spherical lenses. Plano-cylindrical lenses. Sphero-cylindrical lenses. Designation of lens power. Power of lenses. Transposition. Write the prescription. Base curve of spherical lens. Base curve of cylindrical single vision lens. Aberration of lens. Prism prescription. Prism effects in a lens. Neutralization.

Unit-1.2.

Spectacle lenses: Characteristics of lens materials. Specific gravity (weight). Refractive index. Abbe number. Impact resistance. Scratch resistance. Curve variation factor.

Unit-1.3

Current materials: Crownglass. CR-39. High –index glass. High –index plastic. Poly carbonate. Photochromatic materials.

Unit-1.4.

Lens types: Single vision lens. Bi-focal lenses. Tri-focal lenses. Vocational & occupational multifocal progressive lenses.

Unit-1.5.

Introduction of bi-focal lenses: History of bi-focal lenses. Modern bi-focal designs. Types of bi-focal designs. Glass tri-focal lensesPlastic bi-focals.

Unit-1.6.

Opthalmic lens coating: Anti-reflecting coatings. Special notes concerning anti-reflecting coatings. Protective coating, color coating.

Unit-1.7.

Absorptive lenses: Classification of lens tints. Chemical that produces color & assist in absorptive characteristics of glass lenses. Effect in prescription on lens color. Availability of tinted lenses.

Unit-1.8.

Impact resistant lenses: Types of impact resistant lenses. Plastic lenses. Impact resistant Dress-Eye wear lenses. Tempered glass lenses. Types of impact resistant lenses most

beneficial of specific patients.

Unit-1.9.

Lens for special uses: Fresnel lenses. Thinlite lenses. Lenses for the Aphakic patient. Aspheric lenses.

Unit-1.10.

Lens surfacing & quality. Principles of lens surface generation. Glass assessment. Faults in lens materials & lens surface. Inspection of lens quality.

UNIT-2. BASICS OF DISPENSING:

Unit-2.1.

Spectacle frame. Current frame materials: Plastics, Metals Frame types: Combination of frames Half-eye frames, Mounts, Nylon-cord frame, Special purpose frames.

Unit-2.2.

Frame measurements: The boxing system The datum system, Comparison of the two systems

Unit-2.3.

Frame Selection: Fashion, Function, Feel, Conflicting needs, Price, Standard alignment,

Unit-2.4.

Lens Selection: Ground rule for selection, Selection criteria

Unit-2.5.

Facial Measurement: The PD Visual axes, measuring inter papillary distance, Using PD ruler, Common difficulties in measuring PDs, Measuring monocular PD, Measuring near PD, Progressive.

Unit-2.6.

Pediatric Dispensing: The changing image of spectacle, Age differences. Frame Selection, Technical Criteria, Fashion criteria, Some tips on selection, Lens Selection, Technical criteria, Communicating with kids., The kids corner, Facial measurement of the kids, PDs, Centers, Bi-focals

Unit-2.7.

Dealing with problems: Dealing with clients , Common client problems, Dealing with professional colleagues, Dealing with the laboratories

Unit-2.8.

Special needs dispensing:, Occupational dispensing, Hazards in the work place, Occupational health safety legislation, Common hazards.

Unit-2.9.

Eye protection: Industrial eye protection, Sport, Standards covering eye protection, Lens materials & impact resistance, Frame & eye protection.

TEXT BOOKS

1.M. Jailie : Principles of Ophthalmic Lenses, Edn. 3, 1994.
Clifford W Brooks & Irvin M Borish : System for Ophthalmic Dispensing
2.M.Jalie: Ophthalmic lenses and dispensing.

SDC4DO03 (P) –Dispensing Optics- Practical

Course No: 4.6

Course Code: SDC4DO03 (P)

Course Name: Dispensing Optics-Practical

Credits: 5

Hours: 75

1. Find out the meridian & optical center of ophthalmic lens
2. Neutralization – manual & help of lensometer
3. Identification of lens-spherical, cylindrical & sphero-cylindrical lenses
4. Lens-surfacing & edging, cutting & marking of single vision bifocal progressive
5. Frame measurement: The boxing system, the datum system. Comparison of the two systems, Lens position, segment specification
6. Frame selection: Fashion, function & standard alignment
7. Lens selection: Ground rule for selection, selection criteria.
8. Facial measurements: The PD & measuring inter-pupillary distance using P.D ruler.
9. Common difficulties in measuring P.D, measuring monocular P.D, measuring HVID
10. Measuring heights: - single vision, bifocal, multifocal, progressive
11. Pediatric dispensing

SDC4INT04 (Pr)–Internship/Project

Course No: 4.7

Course Code: SDC4INT04 (Pr)

Course Name: Internship/Project

Credits: 4

Hours: 60

A candidate has to undergo internship either in optometric/ophthalmological industries or hospitals such as, Govt. hospital / medical colleges/ private hospital/, which fulfill the norms decided by the University. The major idea for internship is to implement the things learned and to get a real life experience.

Every student will be assigned an internal guide, allotted from the parent department concerned or an expert available in the college appointed by the principal or the head of the department. The student has to make regular discussions with the guide while choosing the subject/area and throughout the life time of the project.

SEMESTER-V

GEC5NU01–Nutrition

Course No: 5.1

Course Code: GEC5NU01

Course Name: Nutrition

Credits: 4

Hours: 60

Unit 1:
Introduction to Nutrition and Food Science, Food Groups and Food Pyramid, Balanced diet for different age groups, recommended dietary Allowances, Assessment of Nutritional Status.

Unit 2:
Energy– Units, Metabolisms, Energy expenditure, and Energy imbalance, Digestion, absorption and transport of Food,

Unit 3:
Proteins and eye, Lipids and eye.Carbohydrates and eye, Vitamins and eye

Unit 4:
Minerals and trace elements and eye, Caratenoids and eye, Oxidative stress and the eye

Unit 5:
Vitamin A, C and E deficiency, Nutrition and ocular aging, Contraindications, Adverse reactions and ocular nutritional supplements.

Text Book

1. M Swaminathan: Handbook of Food and Nutrition, fifth edition, Bangalore printing& publishingCo.Ltd,Bangalore,2004
2. C Gopalan, BV Rama Sastri, SC Balasubramanian: Nutritive Value of Indian Foods, National Institute of Nutrition, ICMR, Hyderabad,2004
3. Frank Eperjesi&Stephen Beatty: Nutrition and the Eye: A practical Approach.

SDC5GP01– Geriatric & Pediatric Optometry

Course No: 5.2

Course Code: SDC5GP01

Course Name: Geriatric & Pediatric Optometry

Credits: 4

Hours: 60.

Unit: 1
GERIATRIC OPTOMETRY
Structural , and morphological changes of eye in elderly Physiological changes in eye in the course of aging. Introduction to geriatric medicine – epidemiology , need for optometry care, systemic diseases (Hypertension, Atherosclerosis, coronary heart disease,

congestive Heart failure, Cerebrovascular disease, Diabetes, COPD) Optometric Examination of the Older Adult

Unit: 2

Ocular diseases common in old eye, with special reference to cataract, glaucoma, macular disorders, vascular diseases of the eye Contact lenses in elderly Pharmacological aspects of aging Low vision causes, management and rehabilitation in geriatrics. Spectacle dispensing in elderly – Considerations of spectacle lenses and frames

Unit: 3

PEDIATRIC OPTOMETRY

Pediatric optometry The Development of Eye and Vision History taking Paediatric subjects Assessment of visual acuity Normal appearance, pathology and structural anomalies of

a) Orbit, Eye lids, lacrimal system,

b) Conjunctiva, Cornea, Sclera Anterior chamber, Uveal tract, Pupil c) Lens, vitreous, Fundus Oculomotor system

Unit: 4

Refractive Examination Determining binocular status Determining sensory motor adaptability Compensatory treatment and remedial therapy for : Myopia, Pseudomyopia, Hyperopia, Astigmatism, Anisometropia, Amblyopia Remedial and Compensatory treatment of Strabismus and Nystagmus

Unit: 5

Paediatric eye disorders : Cataract, Retinopathy of Prematurity, Retinoblastoma, Neuromuscular conditions (myotonic dystrophy, mitochondrial cytopathy), and Genetics Anterior segment dysgenesis, Aniridia, Microphthalmos, Coloboma, Albinism Spectacle dispensing for children Paediatric contact lenses Low vision assessment in children

Text books :

.1.DE Rosenblatt, VS Natarajan: Primer on geriatric Care- A clinical approach to the older patient, Printers Castle, Cochin, 2002

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

3. Pediatric Optometry - JEROME ROSNER, Butterworth, London 1982

4. Paediatric Optometry – William Harvey/ Bernard Gilmartin, Butterworth –Heinemann, 2004

References:

1. OP Sharma: Geriatric Care – A textbook of geriatrics and Gerontology, viva books, New Delhi, 2005

2. VS Natarajan: An update on Geriatrics, Sakthi Pathipagam, Chennai, 1998

34. Binocular Vision and Ocular Motility - VON NOORDEN G K Burian Von Noorden's, 2nd Ed., C.V.Mosby Co. St. Louis, 1980.

5. Assessing Children's Vision. By Susan J Leat, Rosalyn H Shute, Carol A Westall.45 Oxford: Butterworth-Heinemann, 1999.

6. Clinical pediatric optometry. LJ Press, BD Moore, Butterworth- Heinemann, 1993

SDC5CL02– Contact Lens

Course No: 5.3

Course Code: SDC5CL02

Course Name: Contact Lens

Credits: 4

Hours: 60

Unit-1:
Contact lens history & development. Benefits of contact lens over spectacle. Manufacturing methods-spin cast, Lethe cut, Cast modeling.
Unit-2.
Slit lamp Examination technique
Unit-3.
Corneal topography- Keratometry & Extended Keratometry
Unit-4.
Contact lens optics-Contact lens & spectacle lens. Back vertex calculation. Contact lens & Tear lens system.
Unit-5.
Classification of contact lens & its material (soft & RGP); Material property.
Unit-6.
Contact lens terminology. RGP & soft lens design. FDA classification of contact lens material.
Unit-7.
Patient selection & prescreening. Indications & contra indications of contact lens.
Unit-8.
Soft spherical contact lens fitting & Assesment.
Unit-9.
Soft contact lens case & maintenance.
Unit-10.
Spherical RGP contact lens fitting & assessment.
Unit-11.
RGP contact lens care & maintenance.

Text Books
1. Monica Chaudhry:Contact Lens Primer,Jaypee Brothers Medical Publishers,2007
Reference:
1.IACLE modules 1 - 10
2.CLAO Volumes 1, 2, 3
3.Anthony J. Phillips : Contact Lenses, 5thedition, Butterworth-Heinemann, 2006
4.Elisabeth A. W. Millis: Medical Contact Lens Practice, Butterworth-Heinemann, 2004
5..E S. Bennett ,V A Henry :Clinical manual of Contact Lenses, 3rd edition, Lippincott Williams and Wilkins, 2008

SDC5BV03– Binocular Vision

Course No: 5.4

Course Code: SDC5BV03

Course Name: Binocular Vision

Credits: 4

Hours: 60

Unit: 1

Binocular Vision and Space perception.

Relative subjective visual direction. ,Retino motor value ,Grades of BSV ,SMP and Cyclopean Eye ,Correspondence, Fusion, Diplopia, Retinal rivalry ,Horopter ,Physiological Diplopia and Suppression ,Stereopsis, Panum's area, BSV. ,Stereopsis and monocular clues - significance. ,Egocentric location, clinical applications. Theories of Binocular vision.

Unit: 2

Uniocular & Binocular movements - fixation, saccadic & pursuits. ,Version & Vergence.

Unit: 3

Neuro-muscular anomalies, Classification and etiological factors

Unit :4

Convergent strabismus

Accommodative convergent squint –Classification,Investigation and Management

.Non accommodative Convergent squint,Classification ,Investigation and Management

Unit :5

Divergent Strabismus-Classification A& V phenomenon Investigation and Management.Vertical strabismus- Classification Investigation and Management **Unit: IV** Paralytic Strabismus- Acquired and Congenital Clinical Characteristics Distinction from comitant and restrictive Squint Investigations –

Unit: 6

Clinical features of Restrictive Strabismus-Duane's Retraction syndrome,Brown's Superior oblique sheath syndrome,Strabismus fixus ,Congenital muscle fibrosis

Unit :7

History and symptoms ,Head Posture -Diplopia Charting ,Hess chart ,PBCT ,Nine directions,Surgical & Non Surgical Management of Squint

Text Books:

1.AK Khurana: Theory and Practice of Squint and Orthoptics,CBS Publishers,2017

2.AK Khurana: Comprehensive Ophthalmology, sixth edition, JP Publishers, New Delhi, 2015

Reference:

1.Pradeep Sharma: Strabismus simplified, New Delhi, First edition, 1999, Modern publishers.

3. Fiona J. Rowe: Clinical Orthoptics, second edition, 2004, Blackwell Science Ltd

4. Gunter K. Von Noorden: BURIAN- VON NOORDEN'S Binocular vision and ocular motility theory and management of strabismus, Missouri, Second edition, 1980, C. V. Mosby Company

5. Mitchell Scheiman; Bruce Wick: Clinical Management of Binocular Vision Heterophoric, Accommodative, and Eye Movement Disorders, 2008, Lippincot Williams & Wilkins publishers

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

SDC5LV04– Low Vision Aid & Visual Rehabilitation

Course No: 5.5

Course Code: SDC5LV04

Course Name: Low Vision Aid & Visual Rehabilitation

Credits: 4

Hours: 60

Unit:1.
Definition-old, new, proposed, b) Grades of low vision, c) Statistics/ Epidemiology d) Relation between disorder, impairment & handicapped,

Unit:2
Low vision optics: Magnification-relative distance/ relative size/ approach/angular Optics of Galilian & Keplarian telescope- advantage/disadvantage, significance of exit & entrance pupil. Optics of spectacle magnifier/ determination/ calculation/ disadvantage/advantage. Optics of stand magnifier, significance of equivalent viewing distance & calculations. Telescope- distance/ near/ telemicroscope/ monocular/ binocular/ bioptic. Determination of decentration of lenses /prism/calculation/Lebenson's formula/simple dioptric formula. Hand held magnifier-illuminated/ non-illuminated. Spectacle magnifier / half eye/ prism correction/ bar magnifier/ CCTV/ magni-cam/ low vision imaging system or V-max / contact lens & IOL telescope.

Unit:3.
Low vision examination: Task/ Goal oriented history-medical/ visual/ psychological history/ task analysis/ mobility/distance vision/ near vision / daily living/ illumination/ work & school. Visual acuity measurement-distance/ near/ use of log MAR chart (distance & near)/ light house, picture chart/ visual field/ Amsler chart/ contrast sensitivity/ overview of glare testing. Low vision refraction.

Unit:4.
Assessment & prescription of low vision devices-optical/ non-optical/ rehabilitation services. Non- optical devices-pen/umbrella/ boldline note book/ illumination/ letter writer/ environmental modification/ signature guide/ needle threader/ eccentric viewing strategies.

Unit:5
Overview of Rehabilitation Services:- definition/ implementation/ vocational guidance/educational guidance/ mobility & orientation training / special teacher/ special school/ Braille system/ integrated system/referral center- activity/ support/ loan.

Unit:6
Overview of systematic / retinal diseases in relation to low vision:- acromatopsia/ LMBB syndrome/ labers congenital anomaly/ down syndrome/ retinitis pigmentosa/ diabetic retinopathy/ optic atrophy/ albinism/ aniridia.

Unit:7.
Counseling of low vision patient/ parents/ guardians/relatives.

Text Books:
1.Monica Chaudhry:Low Vision Aids,Jaypee Brothers Medical Publishers,2010

Reference:
2.The Art & Practice of Low Vision , By Freeman & Jose, Butterwort Pub.
3.Understanding Low Vision , AFB Publication
4.Low Vision, Fayea E.E.

SDC5CLBV05 (P) – Contact Lens & Binocular Vision-Practical

Course No: 5.6

Course Code: SDC5CLBV05 (P)

Course Name: Contact Lens & Binocular Vision-Practical

Credits: 6

Hours: 90

Contact Lens

a) Routine clinical procedure for contact lens patient & selection of contact lens.
b) Keratometry & slit lamp Biomicroscopy.
c) Spherical soft & Spherical RGP contact lens fitting: selection of contact lens Base curve, diameter & Power & fitting Assessment.
d) Insertion & Removal of soft & RGP contact lens.
e) Contact lens & maintenance.

Binocular Vision

a) Exta ocular Motility
b)Cover tests-Alternate & Cover un cover test
c) Krimsky Test
d) Maddox Rod Test
e) Prism Bar cover test
f) Maddox wing test
g) W4DT
h) Bagolini striated glasses
i) Random dot test
j) TNO test
k) Lang's sterio test

SDC5LVGP06 (P) – Low Vision & Geriatric Pediatric Optometry -Practical

Course No: 5.7

Course Code: SDC5LVGP06 (P)

Course Name: Low Vision & Geriatric Pediatric Optometry -Practical

Credits: 4

Hours: 60

a) Attending in low vision care clinic And history taking
b) Inducing the visual impairment and prescribing magnification
c) Determining reading speed with different types of low vision aids with same magnification
d) Determining reading speed with a low vision aid of different magnification.
e) Understand Amsler chart and uses
f) TBUT test
g) Schirmer's test

SEMESTER-VI

SDC6INT01 (Pr) Major Internship

Course No: 6.1

Course Code: SDC6INT01 (Pr)

Course Name: Major Internship

Credits:30

Hours: 900

The idea for internship is to implement the things learned and to get a real life experience. Short-term working experience in optometric and ophthalmologic companies/ hospitals will help students to get direct hands-on experience. Also, it helps students to get better understanding on the advancement of optometry and ophthalmologic techniques, and to build a strong network with experts and fellows in the optometric and ophthalmologic field, which can positively contribute to future career development.

The Evaluation process of major internship follows 100% external assessment. The major internship should be carried out either in optometric/ophthalmological industries or hospitals such as, Govt. district hospital/ Medical colleges/ Super specialty eye hospitals/ private hospitals, which fulfill the norms decided by the University. The internee shall be entrusted with optometry responsibilities under direct supervision of Senior Optometrist/ ophthalmologist. They shall not be working independently.