Shri Rawatpura Sarkar University, Raipur

Examination Scheme & Syllabus

for

BACHELOR OF OPTOMETRY

SEMESTER-III

(Effective from the session: 2022-23)

Faculty of Science
Shri Rawatpura Sarkar University, Raipur
Bachelor of Optometry
Semester-III
Examination Scheme
(Effective from the session: 2022-23)

S. No.	Course Code	Course Title	Hours / Week			Credits	Maximum Marks			Sem End Exam Duration (Hrs)
			L	**T**	**P**		Continuous Evaluation	Sem End Exam	Total	
1.	SBS07301	Optometric optics		4		4	30	70	100	3
2.	SBS07302	Optometric instrumentation and Clinical examination		4		4	30	70	100	3
3.	SBS07303	Visual Optics		4		4	30	70	100	3
4.	SBS07331	Basics of Computer Application		4		2	15	35	100	3
5.	SBS07391	Lab Course VII: Optometric Optics			4	2	15	35	50	5
6.	SBS07392	Lab Course VIII: Optometric Instrumentations			4	2	15	35	50	5
7.	SBS07393	Lab Course IX: Clinical examination of visual system			4	2	15	35	50	5
	TOTAL			16	12	22			550	

Bachelor of Optometry
Semester-III
2022-23

Course Title	**OPTOMETRIC OPTICS**				
Course Code	**SBS07301**				
Course Credits	**L**	**T**	**P**	**TC**	
	4			**4**	
Prerequisites	Basic knowledge about Optics.				
Course objectives	This subject requires the student to learn the different forms of lenses, manufacturing techniques, surface properties, other parameters and overall quality of lens from manufacturing unit to dispensing counter.				
Course Contents	**UNIT I** SPECTACLE LENSES: Introduction to spectacle lenses, Forms of lenses, Cylindrical lenses, Properties of crossed cylinders, Toric lenses, Toric transposition, Astigmatic lenses, Axis direction of astigmatic lenses, Obliquely crosses cylinders, Sag formula, Miscellaneous spectacle lenses, Vertex distance and vertex power, Tilt induced power, Aberrations in ophthalmic lenses. **UNIT II** Manufacturing techniques of glass, Lens surfacing, Principle of surface generation & glass cements, LENS QUALITY: Faults in lens materials, Faults in lens surface, Inspecting the quality of lenses. **UNIT III** OPHTHALMIC PRISMS: Definition of prisms; units of prism power, Thickness difference and base–apex notation, Dividing, compounding and resolving prisms, Rotary prism and effective prism power in near vision, Prismatic effects, decentration, Prentice's rule, Prismatic effects, Prismatic effect of sphero-cylinders & plano-cylinders, Differential prismatic effect. **UNIT IV** SPECTACLE FRAMES: Frame types and parts, Classification of spectacle				

	frames- material, weight, temple position, coloration, Frame construction, Frame Measurements and markings. **UNIT V** Tinted and protective lenses & frames, Characteristics of tinted lenses, Absorptive glasses, Polarizing filters, Photo chromatic filters, Reflecting filters, Bifocal lenses & Trifocal lenses, Progressive addition lenses, Lenticular lenses, Spectacle magnifiers.
Course Outcomes	The subject will extend the range of clinical and academic material by providing the basics of microbiology for the application of diagnostic.
Text books	1. Dictionary of Ophthalmic Optics Paperback – 9 February 1995 Arthur H. Keeney MD DSc (Author), Robert E. Hagman ABOM FNAO (Author) 2. Optics And Refraction: Podos Series (Textbook of Ophthalmology) Hardcover – 31 December 1991
Reference Books	1. Agarwals Principles of Optics and Refraction 5Ed (HB 2019) Hardcover – 1 January 2019 by Agarwal L. P. (Author) 2. Theory and Practice of Optics & Refraction Paperback – 1 January 2016 by A. K. Khurana (Author) 3. Ophthalmic Optics Paperback – 9 February 1995 Arthur H. Keeney MD DSc (Author), Robert E. Hagman ABOM FNAO (Author)

Bachelor of Optometry
Semester-III
2022-23

Course Title	**OPTOMETRIC INSTRUMENTATION AND CLINICAL EXAMINATION**				
Course Code	**SBS07302**				
Course Credits	**L**	**T**	**P**	**TC**	
	4			**4**	
Prerequisites	Basic knowledge about Optometry instruments.				
Course objectives	The subject will provide the optics and use of Instruments in the field of Optometry. The subject will teach the theory of, and examination with, instrumentation for anterior and posterior eye evaluation, such as ophthalmoscopy, Retinoscopy, contrast sensitivity, color vision and visual acuity measurements (trial case lenses and accessories in the trial box, glare & contrast testing, potential acuity meter and stereo tests), etc. It will also teach the use of instruments required in Specialty fields like Orthoptics and Low Vision.				
Course Contents	**UNIT I** Binocular Vision, Simple and compound microscope- oil immersion eyepiece, Refractive instruments, Test charts standards, Choice of test charts, Trial case lenses & trial frame design, Refractor (phoropter) head units, Optical considerations of refractor units. Near vision difficulties with units and trial frames, Retinoscope – types available, Adjustment of retinoscopes- special features, Cylinder retinoscopy, Objective optometers, Coincidence optometers- principals and details, Infrared optometer devices. The interpretation of objective findings, Special subjective test- polarizing and displacemen Projection charts, Illumination of the consulting room. **UNIT II** SPECIAL INSTRUMENTS & TESTS: Vision analyzer, Pupilometer, Video acuity test, Potential Acuity Meter, Abberometer, OPHTHALMOSCOPES AND RELATED DEVICES: Design of ophthalmoscopes – illumination, Design of ophthalmoscopes- viewing Ophthalmoscope disc filters for ophthalmoscopy, The use of ophthalmoscope in special cases. Lensometer, Lens gauges or clock. **UNIT III**				

	SLIT LAMP Brightness acuity test: Slit lamp systems, Viewing microscope systems Scanning laser devices, Slit lamp accessories Mechanical design instruments, TONOMETER: Tonometer principles Types of tonometers and standardization, Use and interpretation of tonometers, FUNDUS CAMERA: Fundus camera-principle Fundus camera – techniques, External eye photography apparatus, Refractometer, Keratometer and corneal topography. **UNIT IV** COLOR VISION TESTING DEVICES: Color confusion Hue discrimination Colour matching, Different charts used by various age groups, Orthoptic instruments– hapaloscopes, Orthoptic instruments- in office& homedevices, Orthoptic instruments –pleoptics Historical instruments, New instruments currently in use, OPHTHALMIC ULTRASONOGRAPHY: Biometry & Ultrasound "A" scan, "B" scan & UBM OCT, HRT &GDx, Pachymetry & Specular microscopy, Electrophysiology (VEP, ERG, EOG), FFA. **UNIT V** FIELDS OF VISION AND SCREENING 2 DEVICES: Perimeter and visual field Campimeters and fixation devices, llumination of field-testing instruments, Projection perimeters and campimeters, Screening devices for field defects Results of field examination Vision screeners – principles & details, analysis, Bowl perimeter Automated perimeters, Optical devices and electronic (low vision) aids.
Course outcomes	The subject will provide the optics and use of Instruments in the field of Optometry. The subject will teach the theory of, and examination with, instrumentation for anterior and posterior eye evaluation.
Text books	1. Handbook of Visual Optics, Two-Volume Set Kindle Edition by Pablo Artal (Editor) 2. Clinical Procedures for Ocular Examination, Fourth Edition Paperback – 16 January 2016 by Nancy Carlson (Author), Daniel Kurtz (Author)
Reference books	1. Retinal Pigment Epithelium and Macular Diseases (Documenta Ophthalmologica Proceedings Series Book 62) Kindle Edition by Gabriel Coscas (Editor), Felice Cardillo Piccolino (Editor) 2. Clinical Procedures for Ocular Examination, Third Edition Paperback – 16 October 2003 by Nancy Carlson (Author), Daniel Kurtz (Author) 3. Instrumentation for Eyecare Paraprofessionals (The Basic Bookshelf for Eyecare Professionals) Paperback – 30 November 1998 by Michelle Herrin (Author)

Bachelor of Optometry
Semester-III
2022-23

Course Title	**VISUAL OPTICS**				
Course Code	**SBS07303**				
Course Credits	**L**	**T**	**P**	**TC**	
	4			**4**	
Prerequisites	**Basic knowledge about Optics.**				
Course Objectives	The aim of the course is to acquire the knowledge in geometrical optics necessary for its understanding and application in the courses of Optical and optometric instruments, Eye Optics, Refraction and binocular vision, Contact lenses and Optometric practice.				
Course Contents	**UNIT-I** Review of Geometrical Optics: Vergence and Power, Conjugacy, object & image space Sign convention, Spherical refracting surface Spherical mirror; catoptrics power Cardinal points, Magnification, Light and visual function, Clinical Relevance of: Fluorescence, Interference, Diffraction, Polarization, Birefringence, Dichroism, Aberration and application Spherical and Chromatic, Optics of Ocular Stucture : Cornea and aqueous Crystalline lens Vitreous, Schematic and reduced eye**.** **UNIT-II** Measurement of Optical Constant of the Eye: Corneal curvature and thickness Keratometry, Curvature of the lens and ophthalmophakometry Axial and axis of the eye. Basic Aspects of Monocular Vision: Light and Dark Adaptation, Color Vision, Spatial and Temporal Resolution, Science of Measuring visual performance, Application to Clinical Optometry, Refractive anomalies and their causes: Etiology of refractive anomalies Contributing variability and their ranges, Populating distributions of anomalies Optical component measurements Growth of the eye in relation to refractive errors. **UNIT-III** Refractive conditions Emmetropia, Myopia Hyperopia Astigmatism Accommodation, Presbyopia, Anisometropia and Aniseikonia, Aphakia and Pseudophakia correction and management of Amblyopia, Accomodation and				

	its relation to the eye: Far and near points of accommodation, Correction of spherical ametropia Axial versus refractive ametropia Relationship between accommodation and convergence, AC / A ratio. **UNIT-IV** REFRACTION & MAGNIFICATION: Effective power of spectacles: vertex distance effect, Ocular refraction versus spectacle refractionOcular accommodation versus spectacle accommodation, Spectacle magnification and relative spectacle magnification,Retinal image blur; depth of focus and depth of field, Prescribing Prisms / Binocular Refraction, The principles of Photometry measuring blur spread, functions. **UNIT-V** Defocus Blur on point, line and edge spread- functions, the images of gratings (square wave and single wave) Relation between luminous flux and luminous intensity, luminance and illuminance and units of measurement. Blur factors contributing to blur of the retinal image (improper focus, aberration, diffraction and scatter), The concept of spatial frequency and modulation (contrast) Modulation transfer function (MTF) of the eye, Measuring the optical transfer function of lenses (OTF) and contrast sensitivity, Human MTF, use of MTF, its relation to the blur spread functions (using Fourier theory), Constraints on the use of MTF.
Course outcome	The candidates should demonstrate fundamental knowledge and insight into geometrical *optics* in order for the candidate to be able to understand and solve problems related to the eye and *optical* instruments/lenses, their function and correction.
Text books	1. Dictionary of Ophthalmic Optics Paperback – 9 February 1995 Arthur H. Keeney MD DSc (Author), Robert E. Hagman ABOM FNAO (Author) 2. Optics And Refraction: Podos Series (Textbook of Ophthalmology) Hardcover – 31 December 1991
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	2. Theory and Practice of Optics & Refraction Paperback – 1 January 2016 by A. K. Khurana (Author) 3. Ophthalmic Optics Paperback – 9 February 1995 Arthur H. Keeney MD DSc (Author), Robert E. Hagman ABOM FNAO (Author)

Course Title	**BASICS OF COMPUTER APPLICATION**				
Course Code	**SBS07331**				
Course Credits	**L**	**T**	**P**	**TC**	
	2			**2**	
Prerequisites	Basic knowledge about computers.				
Course Objective	The module is designed to provide introduction to Basic math and provides practical approach to hone your computer skills.				
Course Contents	**UNIT-I** Basic integrals**.** **UNIT-II** Basic statistics: Mean, median, mode**.** **UNIT-III** Word, power point, excel. **UNIT-IV** Internet and its advantages & disadvantages. **UNIT-V** Scholarly article search engine, sites.				
Course Outcomes	After successful completion of this module the students would be able to use basic computers to make their projects, presentations and perform statistical functions.				
Text books	1. OBJECTIVE Computer Awareness Paperback – 1 January 2019 by Arihant Experts (Author)				

	2. Computer Paperback – 1 January 2016 by Rani Ahilya (Author)
Reference books	1. Handbook of Computer Science & IT Paperback – 1 January 2013 by Arihant Experts (Author) 2. Joseph, P.T., S.J., E- Commerce: An Indian Perspective, Prentice Hall of India. 3. omputer Programming Crash Course: 7 Books in 1- Coding Languages for Beginners: C++, C#, SQL, Python, Data Science for Python, Raspberry pi and Arduino. Teach Yourself to Code. Learn Faster. Kindle Edition by Julian James McKinnon (Author)

Course Title	**OPTMETRIC OPTICS**				
Course Code	**SBS07391**				
Course Credits	**L**	**T**	**P**	**TC**	
	4			**4**	
Prerequisites	Practical knowledge about Optics.				
Course Contents	1. Photometry 2. Visual acuity, stereo acuity in emmetropia 3. Myopia and pseudomyopia, myopia and visual acuity 4. Myopic correction- subjective verification & monocular & binocular 5. Hypermetropia – determination of manifest error subjectively. Hypermetropic correction- subjective verification 6. Demonstration of astigmatism: Use of slit and keratometry to find the principal meridians 7. Astigmatism: Fan – subjective verification tests 8. Astigmatism: Cross-cylinder. Subjective verification tests. 9. Measurement of accommodation: near and far points and range 10. Presbyopic correction and methods: accommodative reserve, balancing the relative accommodation and cross grid cylinder test 11. Presbyopic correction and methods: accommodative reserve, balancing the relative accommodation and cross grid cylinder test.				
Textbooks	3. Dictionary of Ophthalmic Optics Paperback – 9 February 1995 Arthur H. Keeney MD DSc (Author), Robert E. Hagman ABOM FNAO (Author) 4. Optics And Refraction: Podos Series (Textbook of Ophthalmology) Hardcover – 31 December 1991				

Reference Books	4. Agarwals Principles of Optics and Refraction 5Ed (HB 2019) Hardcover – 1 January 2019 by Agarwal L. P. (Author) 5. Theory and Practice of Optics & Refraction Paperback – 1 January 2016 by A. K. Khurana (Author) 6. Ophthalmic Optics Paperback – 9 February 1995 Arthur H. Keeney MD DSc (Author), Robert E. Hagman ABOM FNAO (Author)

Course Title	**PRACTICAL OPTOMETRIC INSTRUMENTATION**				
Course Code	**SBS07392**				
Course Credits	**L**	**T**	**P**	**TC**	
	4			**4**	
Prerequisites	Basic knowledge about optometry instruments.				
Course Contents	- Refractive instruments, Test charts standards, Choice of test charts, Trial case lenses & trial frame design. - Retinoscope – types available, Adjustment of Retinoscopes - special features, Cylinder retinoscopy. - SPECIAL INSTRUMENTS & TESTS: Brightness acuity test,Video acuity test, Potential Acuity Meter, Abberometer. - OPHTHALMOSCOPES AND RELATED DEVICES: Design of ophthalmoscopes – illumination, Design of ophthalmoscopes- viewing Ophthalmoscope disc filters for ophthalmoscopy. - SLIT LAMP: Slit lamp systems, Viewing microscope systems Scanning laser devices, Slit lamp accessories Mechanical design instruments - TONOMETER: Tonometer principles Types of tonometers and standardization, Use and interpretation of tonometers. - FUNDUS CAMERA: Fundus camera-principles Fundus camera – techniques, External eye photography apparatus. - Keratometer. - Corneal topography. - COLOR VISION TESTING DEVICES: Color confusion Hue discrimination Colour matching, Different charts used by various age groups. - Optical devices and electronic (low vision) aids.				

Bachelor of Optometry
Semester-III
2022-23

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Reference books	1. Retinal Pigment Epithelium and Macular Diseases (Documenta Ophthalmologica Proceedings Series Book 62) Kindle Edition by Gabriel Coscas (Editor), Felice Cardillo Piccolino (Editor) 2. Clinical Procedures for Ocular Examination, Third Edition Paperback – 16 October 2003 by Nancy Carlson (Author), Daniel Kurtz (Author) 3. Instrumentation for Eyecare Paraprofessionals (The Basic Bookshelf for Eyecare Professionals) Paperback – 30 November 1998 by Michelle Herrin (Author)

Course Title	**CLINICAL EXAMINATION OF THE VISUAL SYSTEM**				
Course Code	**SBS07393**				
Course Credits	**L**	**T**	**P**	**TC**	
	4			**4**	
Prerequisites	Basic knowledge about optometry instruments.				
Course Contents	- Refractive instruments, Test charts standards, Choice of test charts, Trial case lenses & trial frame design. - Retinoscope – types available, Adjustment of Retinoscopes - special features, Cylinder retinoscopy. - SPECIAL INSTRUMENTS & TESTS: Brightness acuity test,Video acuity test, Potential Acuity Meter, Abberometer. - OPHTHALMOSCOPES AND RELATED DEVICES: Design of ophthalmoscopes – illumination, Design of ophthalmoscopes- viewing Ophthalmoscope disc filters for ophthalmoscopy. - SLIT LAMP: Slit lamp systems, Viewing microscope systems Scanning laser devices, Slit lamp accessories Mechanical design instruments - TONOMETER: Tonometer principles Types of tonometers and standardization, Use and interpretation of tonometers. - FUNDUS CAMERA: Fundus camera-principles Fundus camera – techniques, External eye photography apparatus. - Keratometer. - Corneal topography. - COLOR VISION TESTING DEVICES: Color confusion Hue discrimination Colour matching, Different charts used by various age				

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