BACHELOR OF PARA MEDICAL TECHNOLOGY (BPMT)

Course Name :- Optometry

Learning Objectives

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

1. Demonstrate a foundational knowledge and understanding of the scientific principles relevant to optometry - properties of light, refraction, the anatomy of the eye and the processing of vision in the brain.
2. Understand the structure and functioning of ophthalmic appliances, such as lenses, and instruments e.g. retinoscopes.
3. Carry out a general eye examination
4. Demonstrate knowledge of human disease processes relevant to eye conditions, ophthalmic pharmacology, contact lens practice and binocular vision.
5. Demonstrate communication skills to deal with patients having various vision related and other ophthalmic problems
6. Assist the physician / medical officer / ophthalmologists in the primary care of patients with ophthalmic problems and diseases.
7. To recognise and refer as necessary, the cases seen in their practice or community to the ophthalmologist

BACHELOR OF PARA MEDICAL TECHNOLOGY (BPMT)

Course Name :- Optometry

1st Year: Assessment System & Syllabus

Sr. No	Paper	Subject	Subject Code	Theory			Practical			Total Marks
				IA	Final	Total	IA	Final	Total	
1	Paper – I	Basic Sciences		30	60	90	30	80	110	200
2	Paper – II	Optics		30	60	90	30	80	110	200
3	Paper - III	Ocular microbiology, Pharmacology and Instruments		30	60	90	30	80	110	200

Paper – I
Basic Sciences

Sr. No.	Topic	Theory Hours	Practical
1	Introduction to Anatomy	1	1
2	Bones of skull (Only nomenclature and major parts)	3	1
3	Bones of vertebral column (Only nomenclature and major parts)	3	1
4	Anatomy & Functions of Nervous System (Only nomenclature and brief functions)	2	1
5	Anatomy of eye	4	2
6	Ocular muscles	1	1
7	Visual Pathway	2	-
8	Relevant anatomy of ear, nose and throat	2	1
9	Relevant anatomy of structures around eye	2	1
10	Introduction to physiology	2	-
11	Relevant physiology of eye	4	-
12	Vitamins with their role in ocular diseases	2	-
13	Introduction to Biochemistry	1	-
14	Introduction to micronutrients and their role in ocular diseases	2	-

Paper – II
Optics

Sr. No.	Topic	Theory Hours
1	Introduction to optics	1
2	Elementary basis of light- Interference, diffraction, polarization spectrum, surface tension, viscosity	3
3	Principles of Refraction.	2
4	Physical Optics -1, Lens Shapes -Convex, Concave	1
5	Physical Optics -2, Thin Lens equation, thick lens equation	1
6	Physical Optics -3, Front and back vertex power	1
7	Physical Optics -4. Aberrations	1
8	Physical Optics -5. Spherical, Cylindrical & Toric surfaces, Aspheric surfaces	3
9	Prisms -definition, uses, nomenclature, apex	3
10	Determination of focal length & diopteric power of lens	1

11	Strum's Conoid	1
12	Neutralization of lenses	1
13	Focimeter	1
14	Centre & Axis Marking by focimeter	1
15	Simple & Toric transposition	2
16	Prismatic effect & Decentration	1
17	Aberrations & Tints in spectacle Lenses	1
18	Spectacle Lens Manufacturing – 1) Manufacturing of glasses 2) surfacing of lenses Sphericals, Toric, Bifocals, Lenticular & Lab Visit	2
19	Spectacle Frames -History, Nomenclature, Types & parts, sides, joints, frame bridge.-	3
20	Shape of Spectacle Frame -Measurements & Making, Frame & Face Measurements1	2
21	Schematic eye	1
22	Emmetropia & Ammetropia -Aetiology, Population, Distribution,Growth of eye	1
23	Introduction to Myopia, Hypermetropia, Astigmatism	2
24	Introduction to Aphakia/Pseudo-phakia, Presbyopia, Keratoconus	2
25	Introduction to corrective lenses	2
26	Assisting in OPD for checking refractive error and prescription of Glasses	5

Paper – III

Ocular microbiology, Pharmacology and Instruments

Sr. No.	Topic	Theory Hours
	Section A	
	Microbiology	
1	Common ocular pathogens	1
2	Sterilization techniques	1
	Section B	
	Pharmacology	
1	Introduction to pharmacology	1
2	Types of drugs use in ophthalmology	2
3	Routes of drug administration	1
4	Introduction to antibacterial, antiviral and antifungal drugs	1
5	Concepts of Miotics, Mydriatics & Cycloplegics drugs	2
6	Introduction to Anti-inflammatory drugs	2
7	Introduction to Anti-glaucoma drugs & therapy	1
8	Ophthalmic dyes	1
9	Introduction to Local Anaesthetics	1
10	Introduction to Ophthalmic preservatives	2
11	Introduction to Ocular lubricants	1
12	Introduction to Ocular irrigating solutions	1
13	Introduction to Ocular antiseptics & disinfectants	1
14	Introduction to Contact lens solution	1
15	Concept of Quality Control	1
16	Introduction to various eye drops preparing:	1
17	Dilution of drug in different concentration	1
18	Introduction to various instruments in ophthalmology	1
19	Demonstration of various instruments in ophthalmology	2
20	General measures in handling of various instruments in ophthalmology	2

All above theory lectures and practical sessions are to be conducted by ophthalmology department (Parent department for optometry). The basic sciences syllabus contents of the above subjects are of basic nature and so they shall be conducted by the ophthalmology department.

BACHELOR OF PARA MEDICAL TECHNOLOGY (BPMT)

Course Name :- Optometry

2nd Year: Assessment System & Syllabus

Sr. No	Paper	Subject	Subject Code	Theory			Practical			Total Marks
				IA	Final	Total	IA	Final	Total	
1	Paper – I	Ocular anatomy, Physiology, Pharmacy and pharmacology		30	60	90	30	80	110	200
2	Paper – II	Optics		30	60	90	30	80	110	200
3	Paper - III	Orthoptics, Ophthalmic instruments and appliances		30	60	90	30	80	110	200

Paper – I

Ocular anatomy, Physiology, Pharmacy and pharmacology

Sr. No.	Topic	Theory Hours
1	REVISION OF OCULAR ANATOMY & PHYSIOLOGY	1
2	OCULAR PHARMACY AND PHARMACOLOGY	1
3	Ocular Pharmacology – An introduction	1
4	Autonomic nervous system	2
5	Routes of drug administration	1
6	Miotics, Mydriatics & Cycloplegics drugs	1
7	Antibacterial drugs & therapy	1
8	Anti-inflammatory drugs & therapy	1
9	Anti-glaucoma drugs & therapy	2
10	Ophthalmic dyes	1
11	Local Anaesthetics	1
13	Ophthalmic preservatives	1
14	Ocular lubricants	1
15	Ocular irrigating solutions	1
16	Ocular antiseptics & disinfectants	1
17	Contact lens solution	1

Paper – II

Optics

Sr. No.	PHYSICAL AND PHYSIOLOGICAL OPTICS	Theory Hours
1	Elementary basis of light- Interference, diffraction, polarization spectrum, surface tension, viscosity	2
2	Principles of Refraction	1
3	Physical Optics –	1
4	Lens Shapes - Convex, Concave	1
5	Thin Lens equation, thick lens equation	2
6	Front and back vertex power	1
7	Aberrations	2
8	Spherical, Cylindrical & Toric surfaces, Aspheric surfaces	1

9	Prisms -definition, uses, nomenclature, apex	1
10	Determination of focal length & diopteric power of lens	1
11	Strum's Conoid	1
12	Neutralization of lenses	1
13	Focimeter	1
14	Centre & Axis Marking by focimeter	1
15	Simple & Toric transposition	1
16	Prismatic effect & Decentration	2
17	Aberrations & Tints in spectacle Lenses	2
18	Spectacle Lens Manufacturing – 1) Manufacturing of glasses 2) surfacing of lenses Sphericals, Toric, Bifocals, Lenticular & Lab Visit	2
19	Spectacle Frames -History, Nomenclature, Types & parts, sides, joints, frame bridge	1
20	Shape of Spectacle Frame -Measurements & Making, Frame & Face Measurements	1
21	Schematic eye	1
22	Emmetropia & Ammetropia -Aetiology, Population, Distribution,Growth of eye	1
23	Myopia	1
24	Hypermetropia	1
25	Astigmatism	1
26	Aphakia/Pseudo-phakia	1
27	Presbyopia	1
28	Keratoconus	1
29	Post-Op. Refractive errors	1
30	Refraction of irregular reflex	1
31	Accommodation & Convergence -1, Far point, near point, range, amplitude of accommodation(2)	2
32	Accommodation & Convergence -2. Methods of measurements, NPA. AC/A ratio.	2
33	Retinoscopy -Principle & Methods	3
34	Objective Refraction	1
35	Subjective Refraction	1
36	Cross Cylinder	1
37	Workshop	1
38	Manufacturing Spectacle Lens	1
39	Plastic Lenses -Manufacturing & Characteristic	1
40	Lens Designs –Ashperic	1
41	High Index Lenses	1
42	Photocromatic Lenses	1
43	Tinted Lenses	1
	Only Defintions and instruments	
1	Polaroid Lenses	1
2	Bifocals	1
3	Measurement for ordering spectacle, IPD, Marking centration, V. D. Calculation	1
4	Fitting Bifocals, Multifocals, Prism Lenses	1
5	Fitting Lenses in Frames	1
6	Glazing & Edging	1
7	Final Checking & Adjustments to prescriptions	1
8	Patient complains, handling correction	1
9	Repair of spectacles	1
10	Test chart standards	1
11	Refraction room Standards	1

Paper – III

Orthoptics, Ophthalmic instruments and appliances

Sr. No.	Topic	Theory Hours
A	**Orthoptics**	
1	General Concept	2
2	Ocular muscles and movements	1
3	Revision	1
4	Latent squint	1
5	Maddox rod	1
6	Maddox wing	1
7	Synoptophore	1
8	Paralytic Squint	1
9	Head posture and its significance	1
10	Occlusion -types and uses	1
11	In brief	
12	A. V. Syndromes	1
13	Testing of ARC	1
14	Amblyopia	2
15	Disorders of accommodation	1
16	Paediatric visual acuity assessment	1
17	Paediatric Refraction Detailed	2
B	**Ophthalmic instruments and appliances**	
1	Indirect Ophthalmoscope	1
2	Direct Ophthalmoscope	1
3	Slit Lamp: Haag-Streit. Detailed	2
4	Lensometer	1
5	Tonometers	1
6	Fundus Camera In brief for FFA	1
7	External eye photography	1

PRACTICALS - II YEAR

Logbook to be maintained by the student from 2nd Year onwards

1. OCULAR PHARMACY AND PHARMACOLOGY	
1	Quality Control
2	Fluorescein Strip preparation
3	Dilution of drug in different concentration
2. REFRACTION	
1	Refraction and prescription of glasses in OPD
3. INVESTIGATIVE OPHTHALMOLOGY	
1	Manifest squint work-up
2	Paralytic squint work-up
3	Orthoptic Exercises
4. OPHTHALMIC INSTRUMENTS AND APPLIANCES	
1	Lensometer
2	Tonometers (Applanation, Schiotz & NCT)
3	Corneal Examination - Placido disc
4	Corneal Examination - Keratometer
5	Corneal Examination Corneal topography
6	Corneal Examination Specular Microscopy
7	Exophthalmometer – In brief
8	Perimeter
9	Auto-refractometer
10	Slit Lamp: Haag-Streit
11	Pachymeter
12	Colour vision tests
5. CONTACT LENS	

1	Routine clinical procedure for contact lens patient & selection of contact lens.
2	Keratometry & slit lamp Biomicroscopy.
3	Spherical soft & Spherical RGP contact lens fitting: selection of contact lens Base curve, diameter & Power & fitting Assessment .
4	Insertion & Removal of soft & RGP contact lens.
5	Contact lens & maintenance.
6. APPLIED OPTOMETRY AND ORTHOPTICS	
1	Orthoptic Instruments
2	Prism Bar
3	Synoptophore
4	Maddox Wing
5	Maddox Rod
6	Red Green Goggles
7	Hess Screen
8	Risley Prisms
9	External eye photography

TO BE PRESENTED - SEMINARS : All students have to make a presentation and present in Seminars according to the assigned topic (Each seminar should be of 1 Hr) – which will be attended by the other students.

II YEAR Topics

1. Optics

1.1. Frames & Spectacle Lens Materials
1.2. Quality control methods of Spectacle Lens
1.3. Application of focimeter and Genva lens measure in optical dispensing.

2. Refraction

2.1. Visual acuity methods
2.2. Principles and application of retinoscopy
2.3. Explanation of various types of refractive error

3. Advanced Refraction

3.1. Comparison between Static and Dynamic Retinoscopy
3.2. Subjective Methods of Refraction
3.3. Objective Methods of Refraction

4. Anterior Segment

4.1 Introduction to eye disorders
4.2. Corneal disorders
4.3. Lenticular disorders

5. Posterior Segment

5.1. Anatomy and physiology of retina & optic nerve
5.2. Principles of direct & indirect Ophthalmoscopy –in brief

6. Tonometry

6.1. Principles & comparison of various types of tonometry
6.2. Standardization of various types of tonometers
6.3. Special methods in tonometry

7. Perimetry

7.1 Introduction to techniques of perimetry

BACHELOR OF PARA MEDICAL TECHNOLOGY (BPMT)

Course Name :- Optometry

3rd Year: Assessment System & Syllabus

Sr. No	Paper	Subject	Subject Code	Theory			Practical			Total Marks
				IA	Final	Total	IA	Final	Total	
1	Paper – I	Technical & advanced Orthoptics		30	60	90	30	80	110	200
2	Paper – II	Contact Lens, technical & advanced refractions		30	60	90	30	80	110	200
3	Paper - III	Eye Bank, Community Ophthalmology , investigations in clinical ophthalmology, management of OT		30	60	90	30	80	110	200

Paper – I
Technical & advanced Orthoptics

Sr. No.	Topic	Theory
1	Orthoptic-General concept	2
2	Ocular muscles and movements	1
3	AC/ A ratio	1
4	Measurements of angle of squint	1
5	Latent squint	1
6	Maddox rod	3
7	Maddox wing	1
8	Synoptophore	1
9	Manifest concomitant	1
10	Squint concomitant	1
11	Paralytic Squint	1
12	Head posture and its significance	1
13	Hess Screening and its Interpretations	1
14	Pleoptics	1
15	Occlusion -types and uses	1
16	A. V. Syndromes	1
17	Testing of ARC	1
18	Amblyopia	1
19	Disorders of accommodation	1
20	Paediatric visual acuity assessment	1
21	Paediatric Refraction	1
Technical & Advanced Optics		

1	Emmetropia & Ammetropia –Aetiology, Population. Distribution, Growth of eye	1
2	Myopia	1
3	Hypermetropia	1
4	Astigmatism	1
5	Aphakia/Pseudo-phakia	1
6	Presbyopia	1
7	Post-Op. Refractive errors	2
8	Accommodation & Convergence – Far point, near point, range, amplitude of accommodation	2
9	Accommodation & Convergence – Methods of measurements. NPA. AC / A ratio.	2
10	Retinoscopy -Principle & Methods	2
11	Objective Refraction	1
13	Subjective Refraction	1
13	Cross Cylinder	1

Paper – II
Contact Lens, technical & advanced refractions

Sr. No.	Topic	Theory
1	History of Contact Lens	1
2	Corneal Anatomy and Physiology	1
3	Corneal Physiology and Contact Lens	1
4	Preliminary Measurements and Investigations	1
5	Slit Lamp Biomicroscopy	2
6	Contact Lens materials	1
7	Optics of the Contact Lens	1
8	Glossary of Terms: Contact Lenses	1
9	Indications and Contra Indications Contact Lens	1
10	Rigid gas permeable contact lens design	1
11	Soft Contact lens design & manufacture	1
12	Fitting philosophies	1
13	Fitting of Spherical SCL and effect of parameter changes	1
14	Astigmatism correction options	2
15	Fitting Spherical RGP contact Lenses, Low OK, High OK	2
16	Effects of RGP contact Lens parameter changes on lens fitting	2
17	Fitting in Astigmatism (Sph RGP)	2
18	Follow-up post fitting examination	1
19	Follow-up Slit Lamp examination	1
20	Fitting in Keratoconus	1
21	Fitting in Aphakia, Pseudophakia	1
22	Cosmetic Contact Lenses	1
23	Fitting Contact Lens in children	1
24	Toric Contact Lenses	2
25	Bifocal Contact Lenses	1
26	Continuous wear and extended wear lenses	1
27	Therapeutic Lenses/Bandage lenses	1
28	Contact lens following ocular surgeries	1
29	Disposable contact lenses, frequent replacement and Lenses	1
30	Care & maintenance of Contact Lenses –In brief	2

31	Contact Lens modification of finished lenses In brief	1
32	Instrumentation in contact lens practise In brief	
33	Checking finished lenses parameters In brief	1
34	Recent developments in Contact lenses In brief	2
35	Review of lenses available in India In brief	1
36	Emmetropia & Ammetropia -Aetiology, Population, Distribution, Growth of eye.- Revision	1
37	Myopia.- Revision	1
38	Hypermetropia.- Revision	1
39	Astigmatism- Revision	2
40	Aphakia/Pseudo-phakia.- Revision	1
41	Presbyopia.- Revision	1
42	Keratoconus- Revision	1
43	Post-Op. Refractive errors- Revision	2
44	Refraction of irregular reflex.-Revision	
45	Accommodation & Convergence -1. Far point, near point, range, amplitude of accommodation.- Revision	1
46	Accommodation & Convergence -2. Methods of measurements, NPA, AC/ A ratio Revision	2
47	Retinoscopy -Principle & Method.- Revision	2
48	Objective Refraction - Revision	1
49	Subjective Refraction - Revision	1
50	Cross Cylinder - Revision	1
51	Low- Vision aids: Techniques & microscopes	1
52	Rehabilitation of the blind	1

Paper – III
Eye Bank, Community Ophthalmology, investigations in clinical ophthalmology, management of OT

Sr. No.	Topic	Theory Hours
1	Eye Bank	
2	Publicity –Awareness of Eye donation	1
3	How to donate your eyes	1
4	Collection of eyes	1
5	Preservation of eyes	1
6	Pre-operative Instructions-Keratoplasty	1
7	Post-operative Instructions-Keratoplasty	1
8	Latest techniques for preservation of donor Cornea	2
9	Community Ophthalmology	
10	Concepts of community Ophthalmology(1)	1
11	The Epidemiology of Blindness(1)	1
12	Screening procedures in Ophthalmology(1)	1
13	5. School eye screening programme(1)	1
14	6. Primary eye care(1)	1
15	7. Organization of out reach services -camp(1)	1
16	8. Rehabilitation of the visually handicapped(1)	1
17	9. National programme for control of Blindness(2)	2
18	10. Vision 2020: The Right to sight (2)	2
19	Investigations in Clinical Ophthalmology	
20	Principles, techniques and preparation of the patient in brief	1

21	Ophthalmic Ultra-sonography –B-Scan	1
22	Fluorescein Angiography	1
23	Ocular Photography -anterior segment	1
24	Syringing & Lacrimal function Test-(Roplas)	1
25	In brief	
26	Pachymetry	1
27	Slit Lamp	2
28	Fundus Photography	2
29	Colour Vision Investigations	1
30	A -Scan Biometry	1
31	Non Contact Tonometry	1

PRACTICALS - III YEAR

- One project should be done by the students (of 100Marks) by the end of III Year
- PHC/RHC posting -4 Months each

Sr. No.	Topics
1. CLINICAL & ADVANCED ORTHOPTICS	
1	Manifest squint work-up
2	Paralytic squint work-up
3	Pleoptics
4	Orthoptic Exercises
2. CLINICAL & ADVANCED OPTICS	
1	Refraction and prescription of glasses in independent cabin
3. CONTACT LENS	
1	Contact Lens fitting
2	Counselling to Contact Lens patient
3	Post-fitting instructions
4	Fitting and assessment of contact lenses – steep, flat, optimum on spherical cornea.
5	Fitting and assessment of contact lenses – steep, flat, optimum on toric cornea with spherical lenses.
6	Fitting and assessment of contact lenses – steep, flat, optimum on toric cornea with toric lenses.
7	Teaching the patient to insert and remove contact lenses.
8	Writing contact lens prescriptions
4. EYE DONATION	
1	Eye Donation counselling
2	Collection of eyes
3	Preservation of eyes
5. COMMUNITY OPHTHALMOLOGY	
1	Eye Screening Programme & Surveys
2	Eye camps (approx. three)
6. INVESTIGATIONS IN CLINICAL OPHTHALMOLOGY	
1	Fluorescein Angiography
2	Syringing & Lacrimal function Test
3	Slit Lamp
4	Corneal topography
5	NCT
6	Applanation and schiotz tonometry
7	A -Scan Biometry
8	Perimetry
9	Keratometry

7. ASSESSMENT OF SQUINT	
1	Motor signs in squint
2	Head position: Face turn, chin position, Head tilt.
3	Cover test & cover-uncover tests Maddox wing to assess heterophoria.
4	Assessment of degree of squint Hirschbag test. Prism bar test. Krimskey test Synoptophore test
5	Assessment of ocular motality status - Hess chart, Diplopia testing, Bielschowskys Head tilting test
6	Assessment of visual sensory status in squint.- Amblyopia Suppression, Binocular single vision – SMP, Fusion, Stereopsis.

In addition, student should be able to perform the skills learnt in YEAR I and YEAR II Student will maintain a log book documenting procedures observed , assisted and performed under supervision

TO BE PRESENTED -SEMINARS :

All students have to make a presentation and present in Seminars according to the assigned topic (Each seminar should be of 1 Hr) – which will be attended by the other students.

III YEAR Topics

1. Orthoptics

1.1. Diagnosis of latent and manifest squint

1.2. Paralytic squint investigations

1.3. Amblyopic and pleoptics treatment

2. Posterior Segments

2.1. Normal & pathological fundus

2.2. Fundus Camera & application of FA.

2.3. Lasers and its uses in Ophthalmology

3. Cornea and Refractive Surgery

3.1. Clinical investigations of pre-refractive Surgery

3.2. Clinical investigations of post-refractive Surgery

3.3. Clinical analysis of refractive Surgery

4. Advanced Refraction and Contact Lenses

4.1. Low vision aids

4.2. Materials and manufacturing techniques of contact lenses

4.3. Indications & Contra-indications for Contact Lenses

5. Advanced Contact Lenses

5.1. Fitting philosophies of contact lenses

5.2. Post fitting problems of contact lenses and its remedy

5.3. Toric/Bifocal Contact lenses

6. Perimetry in Ocular disorders

6.1. Visual fields defects in glaucoma

6.3. Latest development in perimetry

BACHELOR OF PARA MEDICAL TECHNOLOGY (BPMT)

Course Name :- Optometry

TEXT BOOKS & REFERENCES

1. Parson's Text Book of Ophthalmology, 20 th Ed.
2. Khurana's text Book of Ophthalmology
3. Abraham's text Book of Refraction
4. Elkington's Text book of Refraction
5. Text Book of Orthoptics by Fiona Rowe
6. Lecture Notes on Ophthalmology 9 th Edition by Bruce James, Chris Chew, Anthony Bron
7. The Slit Lamp Primer 1st Ed.Edition by Janice K Ledford, Valerie N Sanders
8. Primary Care Ophthalmology 2nd Edition by David A Paley, Jay H. Krachmer
9. Concise Textbook of Ophthalmology 1 st edition by Yog Raj Sharma, Rajeev Sudan
10. Duke Elder-Refraction
11. Khurana's –Optics & Refraction
12. Khurana's –Strabismology
13. Contact lenses-V.K. Dada ,
14. L.V.P.E Contact lens manual.