

MAHARASHTRA STATE BOARD OF VOCATIONAL EDUCATION EXAMINATION, MUMBAI

1	Name of Course	C.C. in Ophthalmic Technician (W.E.F. 2015-16)																																																														
2	Course Code	201228																																																														
3	Max.No.of Students Per Batch	25 students.																																																														
4	Duration	1 YEAR																																																														
5	Type	Full Time																																																														
6	No.Of Days / Week	6 Days																																																														
7	No.Of Hours /Days	7 Hrs																																																														
8	Space Required	Lab = 200 Sq feet <u>Class Room = 200 Sq feet</u> TOTAL = 400 Sq feet 1) MOU with Multi speciality Hospital or with Eye Hospital unit is required 2) Distance between Hospital and Institute Should not be more than 10 Km.																																																														
9	Minimum Entry Qualification	S.S.C. passed																																																														
10	Objective Of Course	To produce in Ophthalmic Technician who should be able to carry out early detection of visual defects and fabricate and dispense glasses. The trainees are to be imparted the following skills. 1. Estimation of errors of Refraction. 2. Fabrication, fitting and checking of prescribed glasses. 3.Carrying out Health education for prevention of peculiar diseases and disabilities. 4. Assistance to ophthalmologist in medical and surgical care of the eye. 5. Skill to conduct ophthalmic survey in community. 6. Identification of cases for reference. 7.Train individuals to dispense a spectacle prescription, given by an Optometrist/ophthalmologist. Cut and fit the spectacles and adjust frames for suitable use.																																																														
11	Employment Opportunity	Wage Employment 1. Ophthalmic Technician at all levels in the National programme for the control of Blindness. 2. Ophthalmic Technician in Medical colleges, District Hospitals, Rural Hospitals etc. 3. Assistant to Eye specialist in private set up. 4. Refraction Assistant. 5. Supervisor in Ophthalmic glass grinding workshop. Self Employment 1.. Setting up Ophthalmic glass fitting shop (Ophthalmic shop). With respective Licensee if required. 2.. Handling the sale of Ophthalmic equipments.																																																														
12	Teacher's Qualification	Bachelor's in Optometry /Diploma in optometry																																																														
13	Training System	Training System Per Week <table><tr><td>Theory</td><td>Practical</td><td>Total</td></tr><tr><td>12 Hours</td><td>30 Hours</td><td>42 Hours</td></tr></table>							Theory	Practical	Total	12 Hours	30 Hours	42 Hours																																																		
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14	Exam.System	<table><tr><td>Sr. No.</td><td>Paper Code</td><td>Name ofSubject</td><td>TH/PR</td><td>Hours</td><td>Max. Marks</td><td>Mini. Marks</td></tr><tr><td>1</td><td>20122811</td><td>Basic of Medical Science</td><td>TH –I</td><td>3 hrs.</td><td>100</td><td>35</td></tr><tr><td>2</td><td>20122812</td><td>Physical and Physiological Optics</td><td>TH-II</td><td>3 hrs.</td><td>100</td><td>35</td></tr><tr><td>3</td><td>20122813</td><td>Spectacles Making & Dispensing Optics</td><td>TH-III</td><td>3 hrs.</td><td>100</td><td>35</td></tr><tr><td>4</td><td>20122821</td><td>Basic of Medical Science</td><td>PR-I</td><td>3 hrs.</td><td>100</td><td>50</td></tr><tr><td>5</td><td>20122822</td><td>Physical and Physiological Optics</td><td>PR-II</td><td>3 hrs.</td><td>100</td><td>50</td></tr><tr><td>6</td><td>20122823</td><td>Spectacles Making & Dispensing Optics</td><td>PR-III</td><td>3 hrs.</td><td>100</td><td>50</td></tr><tr><td></td><td></td><td>Total</td><td></td><td></td><td>600</td><td>255</td></tr></table>							Sr. No.	Paper Code	Name ofSubject	TH/PR	Hours	Max. Marks	Mini. Marks	1	20122811	Basic of Medical Science	TH –I	3 hrs.	100	35	2	20122812	Physical and Physiological Optics	TH-II	3 hrs.	100	35	3	20122813	Spectacles Making & Dispensing Optics	TH-III	3 hrs.	100	35	4	20122821	Basic of Medical Science	PR-I	3 hrs.	100	50	5	20122822	Physical and Physiological Optics	PR-II	3 hrs.	100	50	6	20122823	Spectacles Making & Dispensing Optics	PR-III	3 hrs.	100	50			Total			600	255
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THEORY - I - Basic of Medical Science

1. Anatomy, Physiology, Elementary Pharmacology

And Pathology Ocular Anatomy 1.1 Orbit and its immediate relation

1.2 Lids

1.3 Conjunctiva, cornea and sclera

1.4 Iris and ciliary body, pupil

1.5 Lenses and vitreous

1.6 Retina and choroid

1.7 Ocular muscles

1.8 Brain-General configuration and gross anatomy

1.9 Cranial nerves - I

1.10 Cranial nerves - II

1.11 Visual pathways

1.12 Vascular supply of eye and brain

1.13 Lacrimal apparatus

2. Ocular Physiology

2.1 General physiology of the eye-an introduction

2.2 Cornea and lens

2.3 Papillary reflexes

2.4 Visual acuity and form sense

2.5 Accommodation

2.6 Convergence

2.7 Intraocular pressure

2.8 Night vision

2.9 Colour vision

2.10 Visual fields

2.11 Extrinsic muscles, actions and ocular movements 3.

Ocular Pharmacology and Pathology

3.1 Modes of therapy e.g. drops, injections etc.

3.2 Antibiotic drugs used in ophthalmic practice

3.3 Antiseptics

3.4 Methodology of applying medication to the eyes

3.5 Aseptic techniques

4. Common Ocular Diseases, Special Investigations, Operation Theatre

Procedure

4.1 Introduction to common eye diseases Disease of lid, Conjunctiva, cornea, Iris Lens, Choroid, Sclera, Lacrimal Sac and Glaucoma

4.2 Toxic Amblyopia

5. Special And Routine Investigations

5.1 Requirement of preliminary eye examination

5.2 Visual acuity charting

5.3 Conjunctival swab, smear, culture and sensitivity

5.4 Tension Taking (I.O.T.)

5.5 Colour vision

5.6 Visual fields

5.7 Keratometry

5.8 Auto Refraction meter 5.9 Fluorescence

staining and techniques 5.10 Computerized

perimetry 5.11 Sac syringing

6. Operation Theatre Procedure O. t. And Minor Surgery 6.1 Asepsis -

How to achieve

6.2 Anesthetic Agents

6.3 Carrying out pre-operative investigation, Post operative cares

6.4 Epilation

6.5 Bandaging the eye

6.6 Cataract Surgery

6.7 Intra ocular Lens - Implantation

6.8 Phaco-emulsification

6.9 Refractive Surgery

7. Introduction of optometry A. Anatomy of the Eye Lids

- a) Conjunctiva
- b) Cornea
- c) Sclera
- d) Choroid
- e) Iris
- f) Pupil
- g) Tear Film
- h) Extra ocular muscles
- i) Lens
- j) Anterior and posterior chambers
- k) Aqueous Humor
- l) Vitreous Humor
- m) Retina

8.Common Eye Diseases

- a) Refractive Errors
- b) Cataract
- c) Infections
- d) Glaucoma
- e) Vitamin deficiencies
- f) DM & HT

9.Basic Physics

- a) Light
 - b) Nature of Light
 - c) Theories of light
 - d) Spectrum
 - e) Aberrations and Dispersion through prism
 - f) Refraction and Reflection
- Refraction through Spherical surfaces, diopetre,
Thick and Thin Lenses
- g) Photometry

10.Mathematics

- a) Number Theory
- b) Linear Algebra
- c) Fractions, Cross Multiplication
- d) Overview of trigonometry
- e) Basic Algebra
- f) Decimal Digit

11.Functional English& Communication :

- a) Basic Grammar
- b) Exposure to Language Skills, I Writing and Speaking Skills.
- c) Exposure to Language Skills: II Listening Reading

13.Computers:

Basic Use of MS office and Internet access

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3. Ocular Pharmacology and Pathology
 - 3.1 Modes of therapy e.g. drop injections etc.
 - 3.2 Antibiotic drugs used in ophthalmic practice
 - 3.3 Antiseptics
 - 3.4 Methodology of applying medication to the eyes
 - 3.5 Aseptic techniques
4. Perimetry
 - 4.1 Eye Bandaging i) Atropine 1 % eye ointment tube
 - 4.2 Fluorescence Staining ii) Fluorescence Strip
 - 4.3 Near vision recording iii) Fundoscope
 - 4.4 Colour Vision testing iv) Eye Speculum
 - 4.5 I.O.P. Checking v) Atropine 1 %
 - 4.6 Plain Mirror radiology vi) Distant vision chart
 - 4.7 B.P. estimation vii) near vision chart
 - 4.8 Urine sugar estimation viii) Colour vision chart
 - 4.9 Distant Vision check up ix) Drosyn eye drops
 - 4.10 Fundoscopy x) Tonometer
 - 4.11 Lensometry xi) Bandage eye pad
 - 4.12 Sac syringing xii) B.P. Apparatus
 - 4.13 Spotting
 - xiii) Chloromycetin Applicator's
 - xiv) Lignocaine 2 %
 - xv) Lignocaine 4 %
 - xvi) Maddox rod xvii) Torch
 - xviii) Maddox wing
 - xix) Trial Set
 - xx) Trial frame
- 5.0 Basic Optics
 - 5.1 IPD measurement
 - 5.2 Hand Neutralization
 - 5.3 Lensometry

- 5.4 Transposition
- 5.5 Axis marking
- 5.6 Facial measurements

THEORY - II - Physical and Physiological Optics

1. Physical And Physiological Optics

- 1.1 Elementary basis of light
- 1.2 Principles of refraction 1.3 Lens and their combinations 1.4 Eye as refracting apparatus 1.5 Retinoscopy (Principles)
- 1.6 Cross-cylinder
- 1.7 Myopia and its correction
- 1.8 Astigmatism and its corrections
- 1.9 Presbyopia and Hypermetropia
- 1.10 Anisometropia and Anisokonia
- 1.11 Frames and lenses 1.12 Prescription of glasses 1.13 Low visual aids
- 1.14 Slit lamps (Introductions)
- 1.15 Keratometer (Introductions)
- 1.16 Ophthalmic glasses - physical forms and sizes and shapes
- 1.17 Spherical lenses-power and forms
- 1.18 Refractive media of eye, cornea and lenticular system
- 1.19 Reduced eye, Gauss's Theorem
- 1.20 Aberrations of eye 2.

Prisms

- 2.1 Nomenclature and uses of prism
- 2.2 Reflection and its Law 2.3 Refraction through a slab 2.4 Refraction through prism 2.5 Magnification
- 2.6 Retinoscopy - I
- 2.7 Ophthalmoscope

3. Common Problems Of Refraction

- 3.1 Symptoms, signs, Assessment and correction of Myopia 3.2 Symptoms, signs, Assessment and correction of Hypermetropia 3.3 Symptoms, signs, Assessment and correction of Astigmatism 3.4 Aphakia
- 3.5 Presbyopia

4. Squint And Orthotics

- 4.1 Ocular muscles and movements 4.2 Latent squint - Maddox Rod and wing Test
- 4.3 Concomitant squint
- 4.4 Paralytic squint 4.5 Measurement of angle of squint 4.6 Amblyopia
- 4.7 Orthoptics-synoptophore - Binocular vision 5.

5. Maintenance Of Equipments

- 5.1 Understanding of ophthalmic equipments
- 5.2 Maintenance of surgical instruments - sterilization methods
- 5.3 Instruments used in Eye surgery, Sharp and Blunt, their methods of sterilization
- 5.4 Autoclave

6. Community Ophthalmology

- 6.1 Publicity
- 6.2 Eye screening, programme, school clinics and surveys
- 6.3 Blind and his problems and rehabilitation of the blind
- 6.4 Reading problems in children
- 6.5 Eye camps
- 6.6 Detection of eye diseases due to Nutritional disorders
- 6.7 General disorders affecting the eye
- 6.8 Industrial hazards and protection to industrial hazards
- 6.9 Statistical evaluation of the surveys

7. Health Education

- 7.1 Blindness and causes

- 7.2 Nutrition
- 7.3 Environmental sanitation and water supply, sewage disposal
- 7.4 Integration with other health programme
- 7.5 Specific measures for: Injuries, Zerosis, Trachoma, General Do's and Don'ts 8.

Medical Records

- 8.1 Ophthalmic history taking
- 8.2 Appointments
- 8.3 Drafting and correspondence
- 8.4 Record maintenance 8.5 Coding

9.Geometrical Optics

- 9.1 Vergence and power
- 9.2 Conjugacy, object space and image space
- 9.3 Sign convention
- 9.4 Spherical refracting surface
- 9.5 Spherical mirror; catoptric power
- 9.6 Cardinal points
- 9.7 Magnification
- 9.8 Aberration and application- Spherical and Chromatic
- 9.9 Gullstrand's schematic eyes, visual acuity, Stile Crawford

10.Visual Optics

- 10.1 Emmetropia and ametropia
- 10.2 Blur retinal Imaginary
- 10.3 Thin lens model of the eye – angular magnification – spectacle and relative spectacle magnification.
- 10.4 Aperture stops- entrance and exit pupils.
- 10.5 Astigmatism. - To calculate the position of the line image in a sphero cylindrical lens.
- 10.6 Accommodation – Accommodation formulae and calculations.
- 10.7 Presbyopia- Spectacle magnification, angular magnification of spectacle lens, near point, calculation of adds, depth of field.
- 10.8 Correction of spherical ametropia, vertex distance and effective power, dioptric power of the spectacle, to calculate the dioptric power, angular magnification of spectacles in aphakic,

4

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- 5. Medical Records
 - 5.1 Ophthalmic history taking
 - 5.2 Appointments
 - 5.3 Drafting and correspondence
 - 5.4 Record maintenance
 - 5.5 Coding
- 6. Others
 - 1) Near Vision testing, Distance Vision Checking
 - 2) Spotting
 - Urine sugar estimation
 - i) Trial Frame
 - 3) Plain Mirror radiology ii) Convex Sph. Lens
 - 4) Colour Vision Check up
 - iii) Maddox wing
 - 5) Lensometry
 - iv) Fund scope
 - 6) Sac syringing
 - v) Lensometer
 - 7) Fluorescence staining
 - vi) Pin-hole
 - 8) Maddox rod test
 - vii) Convex Sph. Lens
 - 9) Maddox wing test
 - viii) Convex Cylindrical Lens
 - 10) Refraction, Correction of Presbyopia
 - ix) Convex Cylindrical Lens
 - 11) Measurement of angle of squint with torch
 - x) Occluder
 - 12) Diplopia Test
 - xi) Ophthalmoscope
 - 13) Cover test
 - xii) Ishihara's Chart
 - 14) Pin hole test
 - xiii) Chalazion clamp
 - 15) Spotting
 - xiv) Eye Speculum
 - xv) Maddox rod
 - xvi) Perimetry chart
 - xvii) Iris repositor
 - xviii) Trial Set
 - xix) Lacrimal Conula
- 1.9 Presbyopia and Hypermetropia
- 1.10 Anisometropia of glasses
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- 5. Medical Records
 - 5.1 Ophthalmic history taking
 - 5.2 Appointments
 - 5.3 Drafting and correspondence
 - 5.4 Record maintenance
 - 5.5 Coding
- 6. Others
 - Frame Fitting
 - 1. Types of Frames
 - 2. Frame materials
 - 3. Frame adjus

THEORY - III - Spectacles Making & Dispensing Optics

1. Elementary Lens Grinding and Fitting Of Spectacles

- 1.1 Grinding Machines
- 1.2 Materials for grinding
- 1.3 Theory of lens grinding - spherical
- 1.4 Theory of lens grinding - cylindrical
- 1.5 Chemistry of lenses
- 1.6 Chemistry of plastic and frames
- 1.7 Principles of lens fitting

2. Special Lens Grinding

- 2.1 Spherical Grinding
- 2.2 Cylindrical Grinding
- 2.3 Bifocal Grinding
- 2.4 Aberration and base curves
- 2.5 Aphakic glasses

3. Dispensing Of Spectacles

- 3.1 Human eye and spectacles, Intrerpupillary distance
- 3.2 Bifocals and multifocal requirements types centering
- 3.3 Protective glasses
 - 3.4 High index plastic lenses
 - 3.5 Lens form and thickness
- 3.6 Trial frames and Trial lenses, verification of lenses
- 3.7 Frame types and specific indications
- 3.8 Faces and related spectacle measurements
- 3.9 Spherical fitting
- 3.10 Bifocal fitting
- 3.11 Cylindrical fitting
- 3.12 Contact lenses

4. Community Ophthalmology

- 4.1 Problems rehabilitation of the blind
- 4.2 Reading problems in children
- 4.3 Eye Camps
- 4.4 Detection of eye diseases due to nutritional disorders
- 4.5 General disorders affecting the eye.

Dispensing Optics

SPECTACLE LENSES –PART I

- a) Introduction to spectacle lenses
- b) Forms of lenses.
- c) Cylindrical lenses
- d) Properties of crossed cylinders
- e) Toric lenses
- f) Toric transposition
- g) Astigmatic lenses
- h) Axis direction of astigmatic lenses
- i) Obliquely crosses cylinders.
- j) Sag formula
- k) Miscellaneous spectacle lenses
- l) Vertex distance and vertex power
- m) Tilt induced power.
- n) Lens material properties and Aberrations in ophthalmic lenses

OPHTHALMIC PRISMS

- 1. Definition of prisms; units of prism power.
- 2. Thickness difference and base –apex notation.
- 3. Dividing, compounding and resolving prisms
- 4. Rotary prisms and effective prism power in near vision.
- 5. Prismatic effects, decentration, Prentice's rule.
- 6. Prismatic effect of spherocylinders and plano-cylinders.
- 7. Differential prismatic effect
- 8. Prismatic effect at the near visual point in bifocals
- 9. Jump in Bifocal lenses

INTRODUCTION TO LENS MANUFACTURE

- a) SPECTACLE LENSES -Surfacing and polishing lenses.
- b) Glazing
- c) Manufacturing techniques of glass and plastic lenses
- d) Principle of surface generation and glass cements
- e) **LENS QUALITY**
 - Faults in lens materials
 - Faults in lens surface
 - Properties of lens material
- f) Inspecting the quality of lenses
- g) Special lenses- examination of specimens

BIFOCAL LENSES

- a) Types of Bifocals
- b) Jump effect and prismatic effect
- c) Trifocals

SPECTACLE FRAMES

- a) Frame types and parts and nose pads- Material and types
- b) Classification of spectacle frames- material, weight, temple position, coloration
- c) Frame construction
- d) Frame Measurements and markings
- e) Frame manipulation and repair.
- f) Facial measurements and frame choice.
- g) Power and measurements and frame choice.
- h) Complete dispensing for subjects.
- i) Size, shape and mounting of the ophthalmic lenses.

Tints and Filters

- a) Tinted and protective lenses
- b) Characteristics of tinted lenses
- c) Anti-reflection coating,
- d) Surface Coated lenses (SRC, anti-fog, mirror-coating)
- e) Absorptive glasses
- f) Polarizing filters
- g) Photo chromatic filters
- h) Reflecting filters

Special Lens Designs

- a) Progressive addition lenses, designs, marking, trouble shooting.
- b) Lenticular lenses
- c) Aspheric Lenses

PRACTICAL - III - Spectacles Making & Dispensing Optics

1. Elementary Lens Grinding and Fitting of Spectacles
2. Grinding Machines
3. Materials for grinding
4. Theory of lens grinding - spherical
5. Theory of lens grinding - cylindrical
6. Chemistry of lenses
7. Chemistry of plastic and frames
8. Principles of lens fitting
2. Others
 1. Spherical Grinding
 2. Cylindrical Grinding
 3. Bifocal Grinding
4. Spherical lens fitting in plastic and metal frame
5. Cylindrical lens fitting in plastic and metal frame
6. Bifocal lens fitting in plastic and metal frame
7. Edging of glasses
8. Cutting of a glasses with chipping pliers
9. Lensometry
10. Contact Lenses

Spectacle lens Fitting:

Fitting in Full Rim Frames.

- a. Cutting and fitting of Glass & plastic single vision lenses spherical and cylindrical lenses
- b. Cutting and fitting of bifocals of glass and CR 39 lenses 2.
Fitting in Nylon Supra
- a. Cutting and fitting of Glass & plastic single vision lenses spherical and cylindrical lenses
- b. Cutting and fitting of bifocals of glass and CR 39 lenses 3.
Fitting of 3 piece design, Screw mount and Silhouette types
- c. Cutting and fitting of Glass & plastic single vision lenses spherical and cylindrical lenses
- d. Cutting and fitting of bifocals of glass and CR 39 lenses 4.
Cutting and fitting of Progressives.

Tools and equipments required to be available in Institute

Sr.No.	Name of Items	Required Quantity
1	Perimeter (Luster)	01
2	Tonometer (Schiotz)	03
3	Foci meter/Lensometer	01
4	Exophthalmometer	01
5	Streak refinoscope	01
6	Retinoscope (Mirror)	10
7	Spot retinoscope	01
8	Trial Frame	10
9	Trial sets	05
10	Laboratory equipment	03
11	Staining set, Urine testing set, General Equipment	05
12	Stethoscope	02
Optical Work Shop :-		
1	Spherical grinding machine	01
2	Cylindrical grinding machine	01
3	Spherical tools	01
4	Cylindrical t	01
5	Spherical grinding machine	01
6	Cylindrical grinding machine	01
7	Checking gauges 6. General lens measure	01
8	302, 303 Carborundum, emery, barqunder 8. Chipping pliers	01
9	Edging Machines	01
10	Furniture	As per requirement

Requirement for Hospital MOU

Sr.No.	Name of Items	Required Quantity
1	Hand edger (Avanti with Double and single diamond wheel)	10 Nos.
2	Automatic Edger	2 nos.
3	Frame Warmer (Alifya)	2 nos.
4	Lens drilling machine (for Glass and plastic lenses)	2 nos.
5	Automatic Lens Groover machine	2 nos.
6	Diamond Files for Glass and Plastic	1 set
7	Screw box with 10 types of screw.	5 sets
8	Nose pad box with 16 types of nose pads and 1 type with Nose pad screw.	10 nos
9	Lens cleaning Selvet. (Regular) All types of lenses and frames in different materials and designs	As per requirement
10	Standard Frame Adjusting Set of pliers and screwdrivers.	2 nos
11	Stock of Lenses	4 nos
12	Stock of frames	As per requirement
13	Axis marker	As per requirement
14	Lensometers	10 sets
15	Pupilometers and scale (Lab facility can be outsourced with tie up with local Optical Laboratory)	As per requirement

Reference Books

1. Ophthalmic Assistant By Stain and slatt, Mosby and Company
2. Duke Elder Refraction By David Abrang, Churchil livingstone
3. A Text-Book of Ophthalmology By Prof. L.P. Agarwal, Sagar Publication
4. Humman Biology and Physicology By Rosi and Wilson
5. Practical Ophthopics By Keith lyle and Jackson
6. Contact Lenses By V.K. Dada.Sagar Publication, 78, Ved Mansion, Janpath,New Delhi- 110001
7. Text Book of Opthelmology By chattarage.
- 8) Geometrical, Physical and physiological optics by Michel Keating
- 9) System of Ophthalmic Dispensing by Brookes and Borish
- 10) Ophthalmic Optics by Mo. Jalie
