"This prospectus is made under the provisions of the Universities Act, the Postgraduate Institute of Medicine Ordinance, and the General By-Laws No. 1 of 2016 and By-Laws No. 2 of 2016 for Degree of Doctor of Medicine(MD) and Board Certification as a Specialist"

POSTGRADUATE INSTITUTE OF MEDICINE
UNIVERSITY OF COLOMBO, SRI LANKA

PROSPECTUS

DOCTOR OF MEDICINE (MD)
AND
BOARD CERTIFICATION

IN

OPHTHALMOLOGY

2014

BOARD OF STUDY IN
OPHTHALMOLOGY

Contents **Page**

DOCTOR OF MEDICINE (MD) AND BOARD CERTIFICATION IN OPHTHALMOLOGY

1. DESCRIPTION, NOMENCLATURE AND ASSOCIATED AGENCIES OF THE DEGREE PROGRAMME

a. Name of the degree programme-MD in Ophthalmology
b. Full title– MD and Board Certification in Ophthalmology
c. University–University of Colombo, Sri Lanka
d. Faculties and Institutes–Postgraduate Institute of Medicine of the University of Colombo (PGIM)
e. Departments, external resources and associated agencies–Board of Study in Ophthalmology (BOS), Ministry of Health.

2. INTRODUCTION

The Postgraduate in-service training programme and passing of the relevant examinations of the Postgraduate Institute of Medicine of the University of Colombo will lead to the degree of MD (Ophthalmology) awarded by the University of Colombo.
The successful completion of post MD training programme will entitle the trainee to be eligible for Board Certification as a specialist in Ophthalmology by the PGIM on the recommendation of Board of study in Ophthalmology.
The objective of the training programme shall be to ensure that the trainee gains adequate knowledge, clinical acumen, procedural skills, communicative skills and attitudes which will enable the trainee to practice as an ophthalmologist. The trainee should also acquire the professional skills to be an effective leader and a manager in the provision of health information and care, and organization of services. The trainee will also need to be able to design and conduct audits and research projects, critically appraise research publications and be committed to the practice of evidence based medicine and continuing professional development. The trainee will also be exposed to important areas in professionalism and moral and ethical conduct.
The following is an outline of the training, assessment and examination for prospective candidates entering the training programme in Ophthalmology.

3. RATIONALE

In the recent past new changes to postgraduate training has been introduced locally and globally to improve the quality of training and assessments with the objective of producing a specialist to fulfill the expectations of the patients, employers and the Higher Education sector. To achieve this the University Grants Commission and the PGIM has introduced guidelines and recommendations. The external examiners who participated in postgraduate examinations in the PGIM have also recommended amendments to enhance the quality and standards of the training programmes in order to meet the new challenges in the field of postgraduate education. These include changes to the assessment techniques and introduction of formative assessments, a portfolio viva, structured progress reports, Peer Team Ratings (PTR) and a pre Board Certification Assessment (PBCA).

3.1 OVERVIEW

After entering the training programme candidate goes through a structured training programme in units recognized by the PGIM for three years before being eligible for the MD examination. This is a time-based programme with criteria for satisfactory training built in. Assessment of training will be done regularly and necessary steps will be taken by the Board of Study (BOS) to improve the standard of the trainee. The BOS reserves the right to modify the time periods and criteria required for satisfactory training from time to time with adequate notice. After the MD examination the trainee could decide on subspecialty training. If the trainee decides to be a general ophthalmologist he/ she will work in a senior registrar capacity for two years. It will be one year local training and one year overseas training in an approved centre. During the training period the trainee is expected to conduct an approved research project and based on that submit a Dissertation. The trainee should maintain a portfolio during pre and post MD period. The trainee will have to appear for pre board certification assessment and once this is passed the trainee will be considered for board certification as a specialist in general ophthalmology.

If the trainee decides to undergo training in a subspecialty the post MD training period would be three years. The details of subspecialty training programmes are given in the pertinent prospectuses dealing with the relevant subspecialties.

4 ELIGIBILITY CRITERIA FOR ENTRY TO THE MD (OPHTHALMOLOGY) TRAINING PROGRAMME

To be considered for entry to the MD Ophthalmology training program me the candidate has to appear for a selection examination.
To be eligible to sit for the Selection Examination, a candidate should fulfill the following eligibility criteria:

a. Hold a medical degree registered with the Sri Lanka Medical Council
b. Have completed an internship recognized by the Sri Lanka Medical Council
c. Completed one year work experience in Sri Lanka, after internship
d. Comply with any other PGIM regulations.

A candidate with Certificate of Completion of Specialist Training (UK) or equivalent may be exempted from the Selection Examination, Ophthalmic Basic Sciences Examination, Optics and refraction Examination. However the candidate should complete the pre MD training recommended by the BOS and be successful at the MD Examination as well as complete the post MD training recommended by the BOS and be successful at the PBCA in order to be eligible for board certification.

5 SELECTION EXAMINATION

5.1 Format of the examination

This examination shall consist of the following three subjects

A. Anatomy
B. Physiology
C. Pathology, Microbiology and Pharmacology (Considered as one)

Anatomy

C1. **Multiple Choice Questions**: 30 questions of the multiple true/false (MTF) type to be answered in 1 hour. Some of these questions may be replaced with single best response type of questions.

C2. **Structured Essay Questions**: 2 questions to be answered in 1 hour

C3. **Structured** Oral / Viva voce examination: of 20 minutes duration, conducted by a panel of two examiners (one Specialist in Anatomy and one Specialist in Ophthalmology)

Physiology

C1. **Multiple Choice Questions**: 30 questions of the multiple true/false (MTF) type to be answered in 1 hour. Some of these questions may be replaced with single best response type of questions.

C2. **Structured Essay Questions**: 2 questions to be answered in 1 hour

C3. **Structured** Oral / Viva voce examination: of 20 minutes duration, conducted by a panel of two examiners (one Specialist in Physiology and one Specialist in Ophthalmology)

Pathology, Microbiology and Pharmacology

C1. **Multiple Choice Questions**: 60 questions of the multiple true/false (MTF) type to be answered in 2 hours. Some of these questions may be replaced with single best response type of questions.

C2. **Structured Essay Questions**: 2 questions to be answered in 1 hour

C3. **Structured** Oral / Viva voce examination: of 20 minutes duration, conducted by a panel of two examiners (one Specialist in Ophthalmology and one Specialist in Pathology)

The examination will be conducted in 2 steps

Step 1: Multiple Choice Question papers in the 3 subjects

Step 2: Structured Essay Questions and Oral Examinations in the 3 subjects
Candidates must achieve a specified minimum level of performance in Step 1 in order to be eligible to proceed to Step 2.

Marking scheme and pass/fail criteria will be given in annex 1.

6 NUMBER TO BE ADMITTED

The number to be admitted to the MD Ophthalmology training programme from the candidates who pass the Selection Examination will depend on the requirements of the Ministry of Health and the training facilities available, as determined by the BOS. The number to be admitted each year will be indicated in the circular calling for applications. The number may vary from year to year.

7 STAGES AND DURATION OF THE TRAINING PROGRAMME

The training programme shall consist of four stages. During this period trainee should have not less than 80% attendance to be eligible to sit for the examination leading to MD Ophthalmology examination

Stage 1	**Stage 2**	**Stage 3**	**Stage 4**
1st year after selection examination	Four rotations of registrar appointments 2 years	Post MD training local one year	Post MD training overseas one year

Stage 1:

One year of in-service training in a recognized training unit.

During this period of one year the trainee is expected to gain proficiency in clinical examination techniques, pre and postoperative assessments and management of patients, basic surgical skills, basic knowledge in clinical ophthalmology and introduction to Ophthalmic basic sciences. After successful completion of stage I the trainee has to sit for the Ophthalmic Basic Sciences Examination

After passing of Ophthalmic Basic Sciences Examination the trainee shall proceed to Stage 2. If the trainee fails the examination trainee will have to reappear for the next examination.

Stage 2:

Two years of **rotational** appointments as registrar in recognized training units (six months each) allocated according to the availability of training units and trainee preferences based on the merit order in the Ophthalmic basic sciences examination. During this stage the trainee should get an exposure to pediatric ophthalmology for four weeks and to neurology in relation to Ophthalmology for two weeks and training in a vitreo retinal unit for two week.

After satisfactory training of a minimum period of six months in the Stage 2, during which period the trainee is expected to gain proficiency in theoretical and clinical aspects of Optics and refraction, the trainee will be eligible to sit the Optics and Refraction Examination. After passing the Optics and Refraction Examination and satisfactory completion of the Stage 2 of training the trainee will be eligible to appear for the MD Ophthalmology

Examination. After successful completion of MD Ophthalmology Examination the trainee shall proceed to Stage 3.

Stage 3:

This involves one year of post MD training through 2 rotational appointments in recognized training units locally (six months each) as a senior registrar in general ophthalmology.

Stage 4:

This stage is one year of post MD training in an approved overseas training centre.
During the Post MD stages 3 and 4 the trainee should conduct a research project and present a dissertation to the PGIM.

8 TRAINING METHODS AND CALCULATION OF CREDITS

- Clinical training in wards/clinics
  Operative skills training
  Lectures
- Tutorials
- Clinical Case Discussions
- Workshops
- Research and Dissertation
- Portfolio

Table 1 - Calculation of Credits-MD in Ophthalmology

Training component	Credits
A. Pre MD clinical training in stage 1 and 2 [30 hours per week x 144 weeks (45 hours =1 credit)]	96
B. Portfolio	5
C. Case presentations/Small Group Discussions [30x2hours=60 hours (30 hours=1 credit)]	2
D. Lectures [15x2 hours =30 hours (15 hours=1 credit)]	2
E. Workshops/Study days [15x6 hours=90 hours(30 hours=1 credit)]	3
Total	**108**

9 CURRICULUM - MD TRAINING PROGRAMME

The curricula described in **annex 2 (selection exam) annex 3** (**Ophthalmic Basic Sciences) annex 4** (Optics and Refraction) and **annex 5** (**MD Ophthalmology**) are the framework for systematic training in ophthalmology. The overall objective is to ensure that the trainee gains adequate knowledge, clinical acumen, procedural skills, teaching skills, communicative skills and attitudes which will enable the trainee to practice as a ophthalmologist.

10 EVALUATION PROCESS

10.1 Progress reports

Progress reports should be submitted to the PGIM by the respective trainers once in six months during the four Stages of the training programme (Annex 6 PGIM progress report format). If reports are not received on time immediate action will be taken by the Chairperson and Secretary of the BOS to obtain the reports.

10.2 Peer Team Ratings

The Peer Team Rating forms (**Annex 7 PTR form)** should be submitted by the raters once in six months. The trainer should supervise this activity and ensure that the forms are sent to the PGIM.
In the event of reports with adverse comments the BOS will take prompt action according to the General Rules and Regulations.

10.3 Continuous Assessments (CA)

Continuous Assessments (CA) will be carried out by panels of examiners nominated by the BOS during **stage 2** (annex 11 MD Ophthalmology Marking scheme) and submitted to the PGIM

There will be two CAs during the first year of Stage 2 by panel of examiners before Optics and Refraction examination. The trainee must obtain pass marks in at least in one of the two assessments.

There will be four assessments during the 2nd year of the registrar training Stage 2 training before the MD examination The CA consist of a MCQ paper, Structured essay and a clinical examination. The trainee must obtain pass marks in at least two assessments out of four to be eligible to sit for the MD (Ophthalmology) examination.

10.4 Pre MD Training Portfolio: During years 1-3 of the **Pre MD Training - Annex 8**

The main content areas of the Pre MD Training Portfolio shall include the following, authenticated by the Supervisor/Trainer:

- Log of Clinical activities (minimum number and skill level of procedures which should be carried out are given)
- Reflective Practice (on significant clinical events experienced by the trainee and 6 out of 10 specified topics) -
- Teaching (undergraduates / ophthalmic nurses/ ophthalmic technologist / Primary Health care workers)
- Research and Audit
- Ethics and Medico-legal Issues
- Professional Development
- Record of attendance at essential courses
  Record of experience obtained in tutorials, journal clubs, Clinico-pathological Conferences and audits
- Self-assessment of the Training/Acquisition of clinical experience by the Trainee
- Assessment of the Trainee's progress by the Educational supervisor
  These assessments sho*uld inc*lude:
  Mini Clinical Evaluation Exercises
  Case-Based Discussions
  Objective Structured Assessments of Technical Skills
  Peer Team Ratings

And Other

Trainees are expected to maintain a surgical log book details as an annex certified by the supervising consultant during this period

11 MD (OPHTHALMOLOGY) OPHTHALMIC BASIC SCIENCES EXAMINATION

11.1 Format of the examination

This examination shall consist of the following sections.

A. **Ocular Anatomy, Radiology and Genetics (Considered as one)**

B. **Ocular Physiology, basics in ophthalmic Pathology, Epidemiology and statistics** (considered as one)
Each of the above two sections shall have the following components (C)

C 1 MCQ paper
C 2 Structured Essay paper
C 3 Oral / Viva Voce Examination

Ocular Anatomy, Radiology and Genetics

C1. Multiple Choice Questions: 30 questions of the multiple true/false (MTF) type to be answered in 1 hour. Some of these questions may be replaced with single best response type of questions.

C2. Structured Essay Questions: 3 questions to be answered in 1 ½ hour

C3. Structured Oral / Viva voce examination: of 20 minutes duration, conducted by a panel consisting of two consultant Ophthalmologists

Ocular Physiology, basics in ophthalmic Pathology and Epidemiology

C1. Multiple Choice Questions: 30 questions of the multiple true/false (MTF) type to be answered in 1 hour. Some of these questions may be replaced with single best response type of questions.

C2. Structured Essay Questions: 3 questions to be answered in 1 ½ hour

C3. Structured Oral / Viva voce examination: of 20 minutes duration, conducted by a panel consisting of two consultant Ophthalmologists

The details of the Marking Scheme and the pass/fail criteria of the ophthalmic basic sciences examination are given in Annex 9

12 MD (OPHTHALMOLOGY) OPTICS AND REFRACTION EXAMINATION

12.1 Format of the examination

This examination shall consist of three components (C)

C1. Multiple Choice Questions: 45 questions of the multiple true/false (MTF) type to be answered in 1 ½ hours. Some of these questions may be replaced with single best response type of questions.

C2. Structured Essay Questions: 4 questions to be answered in 2 hours

C3. Refraction-Clinicals(2 cases, 30 minutes) and Structured Oral / Viva voce examination (15 minutes duration), conducted by a panel of two examiners.**(Compulsory to pass)**

The details of the Marking Scheme and the pass/fail criteria of the optics and refraction examination are given in Annex 10

13 MD OPHTHALMOLOGY EXAMINATION

This examination consists of medical and surgical ophthalmology, General Medicine and Neurology in relation to ophthalmology, ophthalmic pathology, Basic sciences in relation to clinical Ophthalmology and genetics.

13.1 Eligibility to sit for MD Ophthalmology Examination

- Successful completion of stage1 and Stage 2 of the training programme
- passing of Ophthalmic Basic Sciences Examination
- passing of Optics and refraction examination
- Satisfactory progress reports acceptable to the BOS
- Satisfactory Peer Team Ratings acceptable to the BOS
- A duly completed Training Portfolio which is accepted by the BOS

13.2 Format of the examination

This examination shall consist of three sections (S)

S1) Theory -This section consists of 2 components (C)

C.i. Multiple Choice Questions: 60 questions of the multiple true/false (MTF) type to be answered in 2 hours. Some of these questions may be replaced with single best response type of questions.
The weightage attached to this component - ½

C.ii. Structured Essay Questions: 4 questions to be answered in 3 hours. The weightage attached to this component - ½

S2) Clinicals in Ophthalmology-This section consists of 2 components (C)

C i. Clinicals in Anterior Segment - 30 minutes duration (conducted by a panel of two examiners.one Specialist in Ophthalmology and the external Examiner).The weightage attached to this component - ½

C ii. Posterior Segment– 30 Minutes duration (conducted by a panel of two examiners.one Specialist in Ophthalmology and the external Examiner).The weightage attached to this component - ½

S3) Clinico – orals .This section will consist of 3 components.

C i) Clinicals in Neurology &Medicine in relation to Ophthalmology - duration of 30 minutes (conducted by a panel of three examiners.one Specialist in Ophthalmology and one specialist in either neurology or medicine and the external Examiner).The weightage attached to this component – 1/3

C ii) Viva voce examination - -Ophthalmic Medicine/Ophthalmic Surgery - duration of 20 minutes (conducted by a panel of two examiners.one Specialist in Ophthalmology and the external Examiner).The weight age attached to this component – 1/3

C iii) consists of 2 sub components

a) Viva voce examination-Basic Sciences in relation to Ophthalmology - duration of 20 minutes (conducted by a panel of two examiners. Two Specialists in Ophthalmology).The weight age attached to this sub component – 1/6

b) Viva voce -Ophthalmic Pathology (conducted by a panel of two examiners. one Specialist in Pathology and the external Examiner).The weight age attached to this sub component – 1/6

13.3 Requirements to pass the MD (Ophthalmology) Examination

Given in annex 11

13.4 Ranking

Ranking of candidates will be based on the aggregate of the closed marks of all 3 sections. The number of attempts will be considered and those who pass in a fewer number of attempts being placed above others.

14 CRITERIA TO AWARD THE DR. P. A. WIRASINHA GOLD MEDAL

Must fulfill all the criteria given below

01. First in the merit order list.
02. First attempt.
03. Two closed marks of 25 or more (Excellent Passes-EP), one of which has to be in a Clinicals in Ophthalmology component.

In the event that more than one candidate fulfills criteria 1, 2 and 3 then the candidate who obtained highest marks in the clinicals in Ophthalmology will be awarded the gold medal.

If there are no candidates fulfilling all the above (1, 2 and 3) criteria the medal will not be awarded.

15. POST MD TRAINING

15.1 Training programme

This will consist of 12 months of training locally (Stage 3) as a Senior Registrar in general ophthalmology, and 12 months of training at a recognized centre overseas (Stasge 4), approved by the PGIM. The 12 months of local training can be done *en bloc* or in two parts before and after the period of overseas training.

Trainees should continue to maintain the portfolio during this period. The completed portfolio and the Research paper based on the approved research proposal should be submitted before completion of the post MD training. Trainee should pass the pre board certification assessment to be eligible for board certification.

15.2 Progress Reports

During the Post MD training period, progress reports will have to be submitted by the trainers once in six months. (annex 6)

15.3 Training Portfolio –

The trainee should maintain a Training Portfolio to document and reflect on his/her training experience and identify and correct any weaknesses in the competencies expected of him/her, and also to recognize and analyze any significant clinical events experienced, so that appropriate changes in management could be adopted in order to reduce the risks arising from such situations in the future. The Training Portfolio should be maintained from the time of entry to the training programme up to Board Certification (Stage 1 to Stage 4). The supervisors/Trainers are expected to review the candidate's progress at regular intervals. It is the responsibility of the rainee to obtain the signature of the trainer after these reviews, and submit the Training Portfolio for evaluation by the BOS at the Pre Board Certification Assessment. See annex 13.

15.4 Research Project

The objective of this component is to expose the trainee to research methodology and scientific writing. The work should be original. In the research project the trainee should demonstrate his ability to identify a problem, conduct a literature search, design and conduct a study, collect and manage data, carry out appropriate statistical analyses and present the results, and prepare a dissertation with rational conclusions after a discussion.

The Research Proposal should be submitted to the BOS for approval within six weeks following commencement of the stage 3. The proposal will be assessed and approved by a reviewer appointed by the BOS**.** A supervisor (as much as possible should be one of the trainers) will be appointed by the BOS to assist the trainee. The supervisor should submit periodic progress reports to the BOS. The completed dissertation with approximately 5000 words and at least 20 recent references should be submitted to the PGIM within one month of completing post MD training. The acceptance of the dissertation and obtaining a "Pass Grade" is a prerequisite to be eligible for board certification. See annex 14

16 PRE BOARD CERTIFICATION ASSESSMENT (PBCA)

The PBCA will take the form of a final, summative assessment of the trainee's portfolio, carried out by 2 (or3) independent examiners appointed by the relevant Board of Study or Speciality Board and approved by the Senate of the University of Colombo. The 3rd examiner should be from outside the discipline to improve objectivity.

The trainee will be called for an oral examination, during which he /she will be questioned on the portfolio. The trainee may be required to start with a presentation of 10-15 minutes, on the post –MD training, if the Board deems it appropriate.

The overall assessment will be based on each of the main sections, which should be assessed as satisfactory or not on an overall basis. It is left to the Boards to decide whether to use a rating scale.

If the examiners are of the view that the trainee's performance is unsatisfactory, and the trainee should not be given immediate Board Certification, the examiners must provide the trainee with written feedback on how the portfolio should be improved in order to reach the required standard. The trainee should then re-submit the portfolio within a specified period of time (up to 3-6 months), and face another oral examination based on the re-submitted portfolio. If the trainee is successful at this 2nd oral examination, the date of Board Certification should be backdated as done routinely. If unsuccessful again, the date of Board Certification will be the date of passing the subsequent PBCA following further training for a minimum period of six months in a unit selected by the Board of Study.

16.1 Eligibility criteria

Within a month after the completion of the prescribed post MD training programme, to be eligible to sit the PBCA, the trainee should provide the following:

Satisfactory Completion of Stage 3 and Stage 4 of post MD training

- Submission of Training Portfolio
- Acceptance of the dissertation
- Satisfactory progress reports on local and overseas training

16.2 Operational details of the Post MD Training Portfolio Viva

A pair of examiners shall conduct the viva at the end of two years Post MD training and award marks independently as described in **Annex 15**.

17 ELIGIBILITY CRITERIA FOR BOARD CERTIFICATION

A trainee who has fulfilled the following criteria shall be deemed to be eligible for Board Certification:

(a) Passed the MD Ophthalmology
(b) Satisfactorily completed one year local and one year overseas training (Post MD) in units approved by the Board of Study.
(c) Submitted satisfactory progress reports from the local supervisor appointed by the Board of Study
(d) Submitted satisfactory progress reports from the overseas supervisor appointed by the Board of Study
(e) Passed the Pre-Board Certification Assessment

18 TRAINERS AND TRAINING UNITS

Specialists with at least three years experience after Board Certification in the field of Ophthalmology will be appointed as trainers by the BOS. The training units will be accredited according to the PGIM guidelines and will be recommended by the BOS.

Reference list for selection exam:-

Anatomy and Embryology

1. Last Anatomy
2. Clinical Anataomy – Harold Lllis
3. Grant's Atlas of Anotomy
4. Clinical Nero Anatomy – Richard S Snell
5. Langmans Medical Embryology

Physiology

1. Ganong's review of medical physiology
2. Text book of medical physiology – Guyten & Hall

Pathology

1. Robbin's basic pathology - Kumar Abbas
2. Robbin's Pathological Basis of Disease - Kumar Abbas
3. Concise Pathology

Pharmacology

1. Pharmacology – H P Rang , M. M. Dale
2. British National Formulary
3. Clinical Pharmacology – Lorrence & Bennet

Micro Biology and Parasitology

1. Medical Micro Biology – David Greenwood
2. Note on Medical Micro Biology – Timbury

Reference list for Ophthalmic Basis Sciences Examination

Orbital and Ocular Anatomy

1. Wolff's Anatomy of the Eye & Orbit
2. Clinical Anatomy of the Eye – Richard N. Snell
3. American Academy of Ophthalmology – Fundamentals and principles of Ophthalmology

Ocular Physiology

1. Adlers Physiology of the Eye 11th Edition
2. Physiology of the eye – Davson
3. American Academy of Ophthalmology – Fundamentals and principles of Ophthalmology

Basics in Ocular Pathology

1. The Eye Basis science in practice – John V Foresster (Relevant chapters)
2. Clinical Ophthalmology a systematic approach – Jack Kanski (Relevant chapters)

REFERENCES – OPTICS AND REFRACTION

A R Elkington,H J Frank Clinical Optics
Albert DM, Miller JW, Azar DT, Blodi BA, eds. *Albert and Jakobiec's Principles and Practice of Ophthalmology*. 3rd ed. Philadelphia: saunders; 2008.
Campbell CJ. *Physiological Optics*. Hagerstown, MD: Harper & Row; 1974
Corboy JM, *the Retinoscopy Book: an Introductory Manual for Eye Care Professionals*. 5th ed. Thorofare, NJ: Slack; 2003.
Duke- Elder S, Abrams D. *System of Ophthalmology. Volume V, Ophthalmic Optics and Refraction*. St Louis: Mosby; 1970.
Michaels DD, *Visual Optics and Refraction: A Clinical Approach*, 3rd ed. St Louis: Mosby' 1985.
Milder B, Rubin ML. *The Fine Art of Prescribing Glasses Without Making a Spectacle of Yourself*. 3rd ed. Gainesville, FL: Triad; 2004.
Rubin ML. *Optics for Clinicians*. Gainesville, FL: Triad; 1993.
Stein Ha, Slatt BJ, Stein RM. *Fitting Guide for Rigid and Soft Contact Lenses: A practical Approach*. 4th ed. St Louis: Mosby; 2002
Tasman W, Jaeger EA, eds. *Duane's Clinical Ophthalmology*. Philadelphia: Lippincott- Raven; 1995.
Yanoff M, Duker J. *Ophthalmology*. 2nd ed. St Louis: Mosby; 2004.

Reference list for MD Ophthalmology examination

1. Duen's Clinical Ophthalmology
2. American Academy of Ophthalmology - Basis and clinical science course 12 volumes
3. Binocular Vision and Ocular Motility – Trimble
4. Atlas of Strabismus – Von Noorden
5. Clinical Ophthalmology – Jack J Kanski
6. World Glaucoma Association - Consensus Series
7. Diseases of Orbit – Rootman
8. Ophthalmic Pathology – Spencer
9. Pediatric Ophthalmology – Taylor
10. Neuro Ophthalmology Review Manual – Bagandas
11. Ophthalmic Lasers – Lesperance
12. Modern Ophthalmology 3 volumes
13. Journals – (Major reviews and updates)
    a) Survey of ophthalmology
    b) Eye
    c) Archives
    d) American journal of Ophthalmology
    e) British journal of Ophthalmology
    f) Ophthalmology
14. Stallard Eye Surgery

Annexes

Annex 1

Exam format and marking scheme MD (Ophthalmology)Selection Examination

A. Format of the examination

This examination shall consist of the following three subjects

A. Anatomy
B. Physiology
C. Pathology, Microbiology andPharmacology (Considered as one)

Each of the above subjects shall have the following components (C)

C 1 MCQ paper
C 2 Structured Essay paper
C 3 Structured Oral / Viva Voce Examination

Anatomy

C1. **Multiple Choice Questions**: 30 questions of the multiple true/false (MTF) type to be answered in 1 hour. Some of these questions may be replaced with single best response type of questions.
C2. **StructuredEssay Questions**: 2 questions to be answered in 1 hour
C3. **Structured**Oral / Viva voce examination: of 20 minutes duration, conducted by a panel of two examiners (one Specialist in Anatomy and one Specialist in Ophthalmology)

Physiology

C1. **Multiple Choice Questions**: 30 questions of the multiple true/false (MTF) type to be answered in 1 hour. Some of these questions may be replaced with single best response type of questions.
C2. **Structured Essay Questions**: 2 questions to be answered in 1 hour
C3. **Structured**Oral / Viva voce examination: of 20 minutes duration, conducted by a panel of two examiners (one Specialist in Physiology and one Specialist in Ophthalmology)

Pathology, Microbiology and Pharmacology

C1. **Multiple Choice Questions**: 60 questions of the multiple true/false (MTF) type to be answered in 2 hours. Some of these questions may be replaced with single best response type of questions.
C2. **Structured Essay Questions**: 2 questions to be answered in 1 hour
C3. **Structured** Oral / Viva voce examination: of 20 minutes duration, conducted by a panel of two examiners (one Specialist in Pathology / Microbiology / Pharmacology and one Specialist in Ophthalmology)

The examination will be conducted in 2 steps

Step 1: Multiple Choice Question papers in the 3 subjects
Step 2: Structured Essay Questions and Oral Examinations in the 3 subjects

Candidates must achieve a specified minimum level of performance in Step 1 in order to be eligible to proceed to Step 2.

B. Marking Schemes

MCQ papers:

MCQs in Anatomy and Physiology will be given as MCQ paper I and the MCQs in .Pathology, Microbiology and Pharmacology will be given as MCQ paper II

Each question will have 5 responses and will carry 5 marks. One mark for each correct answer and one minus mark for each incorrect answer will be awarded. Negative marks of the individual MCQ questions will **not** be carried over to other questions. The lowest mark for a given question will be zero.

The total marks obtained per subject will be calculated and converted to a percentage mark out of 100. This will be subsequently converted to a closed mark and grade according to the scale given (range 10-29)

A candidate must obtain a minimum closed mark of 15in the MCQ paper in each of the three subjects in order to be eligible to proceed to Step 2 (Essay papers and Viva) of the examinations.

Structured Essay Questions

The 6 questions pertaining to the 3 subjects shall be given as one paper, to be answered in 3 hours.

Each question will be marked independently by 2 examiners, according to a pre-set model answer and marking grid.

1. For each part of a question the weightage of marks is to be indicated as a percentage at the time of setting of the paper by the examiners and indicated in the question paper.

Eg: Q1	a)	- 50%
	b)	- 35%
	c)	- 15%

2. Each part question is to be marked using **0-100scale.**

BF - BAD FAILURE	----------	0-<40
MF-MARGINAL FAILURE	----------	≥40-<60
P-PASS	----------	≥60-<80
EP-EXCELLENT PASS	----------	≥80-≤100

3. The mark obtained for each part of a question should be multiplied by percentage allocated for that part and the results should be added up

   Eg: Q1 a) 60 - 50% - 30
   b) 70- 35% - 24.5
   c) 60 - 15% 09
   63.5

4. The mark obtained for each question awarded by the 2 examiners are averaged to obtain the final mark for each question

   Eg Q1 Examiner 1 63.5
   Examiner 2 62.5
   Raw mark for Q1 63.0

5. Add marks for both questions in each subject and divide by the number of questions (i.e 2) (Average)

   Eg:
   1) 63.0
   2) 60.0
   Average 61.5

6. This raw mark for the structured essay paper is converted to the closed mark using the grid given in annexure 2.

Viva voce examination

Each viva will be marked independently by the 2 examiners using the closed marking scale ranging from 10 to 29 according to the guide given in Annexure 3. These would be averaged for each of the three subjects (Anatomy, Physiology and Pathology, Microbiology and Pharmacology,) separately to give the final mark for the viva (for each subject).

If there is a discrepancy of more than 3 between the closed marks given by the two relevant examiners, either in the essay paper or in the Viva voce examination they should review the given marks along with the chief examiner.

Calculation of final mark for each subject

The closed marks of the three components of each subject will be added and divided by 3 in order to derive the final closed mark for the subject.

This will also be converted to the grade of the closed marking scheme using the following grid.

BF - BAD FAILURE	----------	$\geq 10 < 15$
MF-MARGINAL FAILURE	----------	$\geq 15 < 20$
P-PASS	----------	$\geq 20 < 25$
EP-EXCELLENT PASS	----------	$\geq 25 \leq 29$

The MCQ numeric mark expressed as a percentage (Rounded to the nearest Integer) shall be converted to the closed mark and grade according to the grid below

PERCENTAGE MARK	CLOSED MARK	GRADE
≤41	10	
42-43	11	
44-45	12	BAD FAILURE -BF
46-47	13	
48-49	14	
50-51	15	
52-53	16	
54-55	17	MARGINAL FAILURE-MF
56-57	18	
58-59	19	
60-61	20	
62-63	21	
64-65	22	PASS-P
66-67	23	
68-69	24	
70-71	25	
72-73	26	
74-75	27	EXCELLENT PASS-EP
76-77	28	
≥78	29	

Conversion of raw marks of the structured essay to closed marking scheme.

	Raw mark	Final mark
1. BF- Bad failure (0-<40)	0-<8	10
	≥8-<16	11
	≥16-<24	12
	≥24-<32	13
	≥32->40	14
2. MF- Marginal failure (≥40-<60)	≥40-<44	15
	≥44-<48	16
	≥48-<52	17
	≥52-<56	18
	≥56-<60	19
3. P- Pass (≥60-<80)	≥60-<64	20
	≥64-<68	21
	≥68-<72	22
	≥72-<76	23
	≥76-<80	24
4. EP – Excellent pass (≥80-100)	≤80-<84	25
	≥84-<88	26
	≥88-<92	27
	≥92-<96	28
	≥96-≤100	29

Guidelines for the award of grades for Viva Voce examination

Grade		**closed marks- range**
BF - BAD FAILURE	----------	≥10 < 15
MF- MARGINAL FAILURE	----------	≥15 < 20
P - PASS	----------	≥ 20 < 25
EP - EXCELLENT PASS	----------	≥ 25 ≤ 29

Grade	**General descriptors**	**Specific descriptors**
Bad failure -BF **(Major deficiency)**	**Major deficiencies in knowledge and/or in application of knowledge.**	**Knowledge and judgment-**poor basic knowledge and judgment/understanding to a level of concern. **Quality of response-**disorganized and confused; prompts by the examiners do not work(not persuadable)
Marginal failure-MF **(Minor deficiency)**	**-Deficiency in knowledge and in application of knowledge** **-At least two areas that the examiner considers weak and/or overall ability (application of knowledge) not up to the mark**	**Knowledge and judgment-**gaps in knowledge/ difficulty in prioritizing/ struggle to apply knowledge. **Quality of response-**hesitant and indecisive answers; frequent prompting
Pass–P **Deficiencies can be self-corrected or no deficiency**	**No obvious knowledge deficiency** -application of knowledge and practical aspect are acceptable. -deficiencies are such that the examiner could reasonably conclude that the candidate can self-correct them.	**Knowledge and judgment-**Good knowledge and judgment of common problems. Ability to prioritize. **Quality of response** Logical answer with good supporting evidence; prompting limited to aspects related to literature
Excellent Pass -EP **(shows extra ability)**	**Above average** **-**shows extra ability in knowledge and /or in application of knowledge -outstanding ability to clearly vocalize the thought process.	**Knowledge and judgment-**Exceptionally good knowledge and judgment Excellent understanding of breadth and depth of a topic, able to quote from literature **Quality of response-**Confident, clear, logical and focused answers No prompting necessary

C. Requirements to Pass the MD (Ophthalmology) Selection Examination

1. In order to pass **a subject,** a candidate must:

   Obtain a minimum closed mark of 20 for that subject (a grade of **PASS - P** or an **EXCELLENT PASS – EP**

   And

   Not obtain more than one closed mark of less than 20in the 3 components (MCQ, Essay and Viva.)

   And

   Not obtain a closed mark of less than 15 in the essay component.

2. To pass **the examination,** a candidate must obtain passes in all 3 subjects in one and the same examination.

D. Ranking of candidates

Ranking of candidates will be based on the aggregate of the closed marks of all 3 subjects. The number of attempts will be considered and those who pass in a fewer number of attempts being placed above others.

Annex 2

CURRICULUM – SELECTION EXAMINATION

GENERAL ANATOMY

Head, neck, specials & Neuro anatomy
Neuro anatomy

- **Introduction**
  - The structure of nerve tissue – neurons, neuroglia and supporting tissue,
  - the process of myelination
  - Topography and subdivisions of the Nervous System
  - Meninges, venous sinuses and communications C.S.F. formation and drainage
  - The autonomic nervous system
  - Development of the brain and the spinal cord and embryological basis of the congenital anomalies

- **The Brain**

  - The external topography and internal structure of the cerebral hemispheres, special centers, basal ganglia, internal capsule. Cerebral dominance

  - Projection fibers, association fibers and commissural fibers of the cerebrum
  - Ventricles, choroid plexus and the C.S.F. circulation
  - Brain barriers – Blood brain barrier, Blood C.S.F. barrier
  - The vasculature of the CNS, Blood supply, venous drainage of the brain specialized areas.
  - The gross topography of the diencephalon- epithalamus, thalamus hypothalamus and subthalamus
  - The limbic system
  - Pituitary- Anatomical relations, development, neurophysiology, microscopic structure, function, control of secretion, hypothalamo hypophysial circulation

- **Brain stem**
  - Medulla, pons and the midbrain medullary pontine junction, crus cerebri
  - The external and internal topography of the brain stem
    Reticular formation and its functional considerations
  - To draw and label sections of the brainstem at various levels

- **Cerebellum and its connections**

  - Deep cerebellar nuclei, connections and functional considerations

- **Cranial nerves**

  - All cranial nerves. Locations of nuclei, central connections, course both intracerebral, intracranial and their functional considerations.
  - Testing the action of all cranial nerves , CNS examination

- **Spinal cord**
  - The Spinal cord & the spinal nerves
  - Spinal meninges
  - Spinal cord topography, ascending and descending tracts
  - Spinal cord levels
  - Lower motor neurons and upper motor neurons and the characteristic features of the lesions

- **Head and Neck and Specials**
  - Bones- skull, mandible, Cervical vertebrae, Atlas, axis and the joints of the neck, movements of the neck, first thoracic vertebra, the first rib and the manubrium sterni.
  - The external and the internal appearance of the skull, the anterior, middle and posterior cranial fossae and their contents.
  - The formation in the skull, structure that pass through them, base of skull, the bones of the nasal cavity, palate and the paranasal sinuses
  - Anatomy of the temporo mandibular joint
  - Temporal fossa, infra temporal fossa and pterygopalatine fossa and their contents
  - The cervical vertebrae, atlas, axis joints of the neck
  - Skull of the new born

- **Neck**
  - General arrangement of the superficial and deep structures of the neck
  - The facial distribution and tissue spaces in the neck
  - The viscera of the neck
  - Great vessels and nerves of the neck, the carotid system and the vertebrae system
  - Venous drainage of the head, neck lymphatic drainage
  - Arrangement of lymph nodes and lymphatic drainage of the head and neck
  - The anatomy of the root of the neck
  - Cervical plexus formation and distribution
  - Muscles of the neck, face, innervation and actions, testing of the actions where appropriate
  - The anatomy of the thymus, thyroid, parathyroid, histology and development
  - All the soft tissue in the neck. Oesophagus, trachea, pretracheal muscles, pre vertebral and postvertebral muscles.

- **Face**
  - Superficial and deep structures of the face
  - Muscles of facial expression
  - Muscles of mastication
  - The nerves, arteries, veins and lymphatics of the face
  - The parotid gland including its histology
  - Embryology of the face and the basis for the congenital anomalies of the face
  - Scalp, cutaneous innervation, arteries and veins of the scalp

- General arrangement of the autonomic nervous system
- Autonomic nervous system, parasympathetic and sympathetic chain and ganglia, arrangement, innervation actions and applied anatomy
- Cranial autonomic ganglia, connections and relations

- **Specials**
  - Anatomy of all the paranasal sinuses, including their development and applied anatomy
  - Anatomy of the nose, nerve supply, blood supply and development
  - Anatomy of the mouth, tongue, palate and pharynx, blood supply innervation development, swallowing
  - Anatomy of the larynx. Cartilages of the larynx, mucosa of the larynx innervation and practical applications.. speech.

- **Embryology**
  - Development of the head neck pharyngeal arches
  - Embryological basic for the developmental defects in the head neck

- **Surface marking**
  - *Surface marking of important structures in the head and neck*

- **X-Rays**
  - Normal X-Ray CT scan and MRI of the head, neck and brain

Histology of the structures in the region
Applied anatomy of the above where ever indicated

GENERAL PHYSIOLOGY

- Fluid and Electrolyte balance and Osmolality
- Cardiovascular system
  - Capillary pressures, tissue fluid and oedema
  - Blood flow in the circulation
  - Heart as a pump
  - Pressure changes in the heart
  - Venous pressure
  - Cardiac output
  - Peripheral resistance
  - Regulation of arterioles
  - Arterial pulse and blood pressure
  - Regulation of blood pressure, baroreceptors, VMC, CIC
  - Reactive hyperaemia, vasodilatory nerves, axon reflex and triple response
  - Gravitational effects on the circulation
  - Rennin-angiontensin mechanism
  - Pulmonary and cerebral circulation
  - Exercise
  - Haemorrhage

- Respiratory system
  - Pulmonary ventilation
  - Diffusion of gases
  - Gas transport
  - Regulation of respiration
  - Hypoxia and the types of hypoxia
  - Cyanosis
  - Principles of oxygen therapy
  - Respiratory function tests

- Renal physiology
  - Basic principles of renal physiology
  - Renal failure
  - Renal function tests

- Hypothalamic functions, Temperature regulation and fever

- Endocrine physiology
  - Pituitary, thyroid, adrenals and endocrine pancreas

- Blood
  - Components of blood (plasma and plasma proteins, RBC, WBC, platelets) and their functions
  - Erythropoiesis, anaemia and jaundice
  - Blood groups
  - Haemostasis

- Nerve and muscles physiology
  - Action potential
  - Nerve impulse transmission
  - Neuromuscular junction
  - Muscles contraction
  - Degeneration and regeneration of nerves
  - Autonomic nerve systems
  - Neurotransmission
  - Physiology of sensory nervous system
  - Physiology of motor function
  - Physiology of pain and consciousness
  - CSF composition, formation and drainage

- Regulation of hydrogen ion balance
- Liver function tests and assessment

GENERAL PATHOLOGY

- Normal cell – cell types, structure of cells, cell membrane, cell movement, cell growth, cell adhesion, cell nucleus, RNA, DNA, cytoplasm and formed structures in the cytoplasm, cell cycle PCR reaction

- Causes and effects of cell injury, adoptive changes following cell damage. Cell damage accompanied by accumulation of fat and water-fatty change. Biochemical and structural changes occurring in cell injury-pathology of autolysis, necrosis, gangrene. Types of necrosis.

- Connective tissue, its normal structure-fibroblasts, pericytes, ground substance, fibronectin and the effects of disease, excessive accumulation ofground substance, diminution in amount of ground sustance, mucopolysaccharidoses, hyalinosis, solar elastosis, Marfan's syndrome. Basic knowledge of miscellaneous tissue degenerations mucoid, hyaline fibrinoid.

- Amyloidosis-Composition and nature of amyloid, classification of amyloidoses, diagnosis of amyloid diseases in life and causes of amyloidosis.

- Causes, changes, mediators and sequelae of acute and chronic inflammatory processes.

- Aetiology, pathogenesis, pathological effects and distribution in the body of chronic granulomatous diseases – tuberculosis, syphilis, leprosy and fungal diseases.

- Principles involved in healing of skin wounds by primary and secondary intention, fracture healing, nerve and muscle healing.

- Factors predisposing to thrombosis in different sites of the cardiovascular system, morphology, structure and fate of thrombi, different types of emboli and their effects.

- Causes and pathological changes in ischaemia and infraction in different organs- heart, kidney, lung, spleen, brain and intestine.

- Basic knowledge of diseases of infancy, childhood and old age respiratory distress syndrome in new borne, Sudden infant death syndrome,inborn error of metabolism, Haemolytic diseases of new born. Celluar ageing, osteoporosis, osteoarthritis, Parkinson's diseases, temporal arteries.

- Pathological accumulation of calcium, melanin pigment and iron in tissues – Causative factors and effects of such abnormal accumulation.
- Disturbances in the body fluid and electrolyte balance and pathogenesis of odema, pure water deficiency, combined sodium and water deficiency, pure water excess, disturbances of potassium balance, respiratory alkalosis, acidosis. Metabolic acidosis and alkalosis.

- General reaction to trauma, haemorrhage and shock

- Causes of acute and chronic venous congestion and its pathological effects in different
- Body's defenses against infection-sources of infection, transmission of organisms to the body, contamination, pathogenesis of infection and the body's response to infection
- Basics knowledge of immune system, immuno pathogenesis, immunity to infection
- Pathogenesis of immunologically mediated diseases and immunodeficiency disorders
- Basic knowledge of tissue transplantation. Autograft, homograft, xenograft, allografts. Fate of allografts and rejection response.
- Infections- wound infection, hospital infection, viral infection.
- Disturbances of metabolism. Diabetic mellitus – galactosaemia, alcaptonuria, phenylketonuria, G6PD deficiency, glycogenoses, lipidoses, disturbances of purine metabolism, porphyin metabolism.
- Disturbances of nutrition- starvation, obesity, protein energy malnutrition in childhood, vitamin deficiency and trace elements, Malabsorption syndrome-causes and effects
- Disturbances of endocrine function- causes and pathological effects of hyperpituitarism, hypopituitarism. Diseases of adrenal cortex (Cushing's syndrome, adrenal insufficiency) and its pathological, biochemical changes, diagnostic tests in investigating and treating endocrine disorders.
- Temperature regulation, fever and hypothermia basic knowledge of temperature regulating mechanism, pathogenesis of fever, pathogenesis of malignant hyperthermia. Hypothermia, body's response to hypothermia, hypothermia in infancy, adults
- Abnormalities of cell growth – hypertrophy and hyperplasia, atrophy and aplasia, metaplasia and dysplasia
- Aetiology, pathology, classification and morphology of common benign and malignant tumours and tumour markers
- The effect of ionizing radiation- effect upon cells and tissues, total body irradiation, immediate effects, late effects, genetic effects and radiotherapy
- Lympho reticular system: spleen -splenomegaly, atrophy of spleen, hypersplenism lymph nodes- lymphadenopathy and lymphoma. Thymus – hyperplasia, hypoplasia and tumours

- Heamatopoiesis – Factors that control and regulate haematopoiesis, normal RBC, Haemoglobin, some disorders of blood red cells- Anemias, iron deficiency, sideroblastic, megaloblastic anemias, haemolytic anemias, polycythemia

- Formation of WBC, normal and variations in the white cell count, disorders of white blood cells, the leukaemias, ALL, AML, CLL, CML and myelodysplastic syndrome, multiple myeloma, myelosclerosis

- Platelet and coagulation defects- thrombocytopaenia, thrombocythemia, haemorrhagic disease due to vascular damage,hereditary clotting disorders, DIC

- Blood group and blood transfusion- Blood group systems, red cell- Antibody interactions, blood grouping, anti body screening, crossmatching indications for blood transfusion, blood component therapy, adverse effects of blood transfusion

PHARMACOLOGY

Drugs acting on the autonomic nervous system
Neuro humoral transmission at Muscarine and nicotine receptors
Alpha and Beta receptors
Nor adrenaline and adrenaline
Antibiotic chemotherapeutic agents –mechanism of action, unwanted side effects.
Antiviral agents
Local anaesthetics
Teroids
Diagnostic agents
Enzyme preprations
Ocular side effects of drugs used in systemic diseases

MICROBIOLOGY

Micro organisms - Bacteria, virus and fungus
Culture media
Collection and transportation of specimens
Staining techniques
Diagnostic techniques
Antibiotics sensitivity

Annex 3

SYLLABUS – OPHTHALMIC BASIC SCIENCES

OCULAR PHYSIOLOGY

- Eye lids - Secretions

  Lid movements – Blinking, blepharospasm
  Pathway –Associated movements

- Lacrimal system
  Tear film Production
  Maintenance
  Functions of tears
  Clinical correlations
- Cornea Optical properties
  Clarity, pharmacology
  Bio chemistry
  Wound healing, vascularization

- Lens Composition, metabolism
  Water and electrolyte balance, lens proteins, formation of cataract

- Pupils Anatomy, Physiology , Pharmacology
  Afferent and efferent papillary defects
  Anisocoria and light near dissociation

- Vitreous Structure
  Physiology-functions
  Age changes

- Intra ocular pressure Maintenance of IOP

- Aqueous Formation, composition
  Changes in disease
- Accommodation and presbiopia

- Near reflex

- Visual acuity Physiological factors, acuity criteria
  Measurement
  stimuli specifications
  Factors influencing VA

- Binocular vision development
  Grades
  Depth perception-monocular, binocular
- Colour vision
- Electrical phenomina- ERG, EOG, VEP
- E.O.M. structure
  Functions
  Pharmacology
  Physiology
- Entoptic images
- Supra nuclear control of eye movements
- Ocular circulation
  Blood ocular barrier, structure
  Control of circulation / effects of drugs on ocular blood flow
- Radiometry, physical properties of light
- The Biometry of sensory transaction in vertebrate photoreceptors
  Light and dark adaptation
  Visual pigments
- Temporal responsiveness of vision
  Critical flicker fusion frequency
  Fast and slow optic nerve fibers and optic tract fibers
- Retina pigment epithelium functions
  Photoreceptors, cellular organization of retina
- Optic nerve
  Papillodema
  Optic atrophy

OCULAR ANATOMY

The anatomy of the cranial cavity, bony orbit, the paranasal sinuses, bones of the face
Development of the face, orbit and paranasal sinuses
Changes infancy and old age

The ocular appendages
The macroscopic and microscopic anatomy of the eye lids, conjunctiva and the lacrimsl apparatus, including relations, the blood supply, innovation and functional / applied anatomy
Movements of the eye lids, tear secretion and drainage

The arrangement of orbital septa, fascial spaces
Anatomy of the scalp, face arterial, renous drainage, applied anatomy
Venous drainage of the orbit, cavernous sinus and other dural renous sinuses
Facial veins, venous plexuses communications and applied anatomy

The orbital and the cerebral vessels, carotid systems, anastamosis between the carotids
Extra ocular muscles, attachments relation, innervation, microscopic structure, ocular movements and development / Smooth muscles of the orbit
Testing the action of the muscles
Supra nuclear control, neural basics of eye movements
Blood supply to midbrain centers,. Motility problems related to obstruction of blood supply to these centers
Nerves of the orbit, innervation, autonomic, cranial ganglia
Cranial nerves including central connections and peripheral course of 2^{nd} 3^{rd} 4^{th} 5^{th} 6^{th} 7^{th} 8^{th} nerves (all details) and clinical applications.
Testing of the cranial nerves

The gross anatomy of the eye including its dimension, microscopic anatomy of all layers of the eye. Lens, vitreous, angle of the eye and how the structures are related to their functions, blood supply.
Venous drainage nerve supply and lymphatic drainage
Topographic anatomy, surface anatomy

Development of the eye, optic nerve lacrimal gland, developmental, anomales
Neural basis if eye movements and generation of eye movements
The brain
The brain general external topography and internal structure
The visual pathway
Optic nerve, optic chiasms, optic tract, lacrimal geniculate nucleus.. Colliculli
Optic radiation
Thalamus- primary visual cortex, visual association areas
Topography, organization, microscopic anatomy and function ofvisualcortex
Occipital and frontal eye centers
Blood supply to the visual cortex and applied anatomical considerations
Circle of willis and distribution
Cerebellum – cerebellar nuclei and connections
Anatomical pathways, ascending and descending tracts
Autonomic nervous system, sympathetic and parasympathetic innervation of the eye and orbit
Lacrimal gland and related structure
Cranial autonomic ganglia and cervical sympathetic chain and distribution

UMN and LMN lesion

BASICS IN OPHTHALMIC PATHOLOGY

Biopsy of ocular tissues
- Indications for biopsy
- Type of biopsy specimens

Processing of biopsy specimens
- Fixation

Handling of biopsy specimens
Orientation of the specimen with identification of surgical margins

Routine stains
Special stains
Common immuno histochemical methods
Electron microscopy
Nuclic acid hybridization
PCR
Processing of enucleated eye
Common inflammatory diseases
Common neoplastic diseases

MEDICAL GENETICS

Basic Genetic Concepts

The trainee should demonstrate a thorough knowledge of the following:

- Chromosomes
- Mitosis and Meiosis
- Chromosome culture and karyotyping
- Nomenclature of human chromosomes
- Chromosome abnormalities
- Genes
- Single gene disorders
- Mendelian patterns of inheritance
- Multifactorial inheritance
- Non-traditional patterns of inheritance
- Polymorphisms and genetic markers, Linkage, Gene mapping

Genetic Testing

The trainee should demonstrate an awareness of the following:

- Benefits, risks and limitations of testing
- Communication, education and informed consent
- Different types of testing
    - Cytogenetics
    - Fluorescent In-Situ-Hybridization (FISH)
    - Molecular Diagnostics
    - Biochemical Diagnostics
    - Tests used in Prenatal Diagnosis
    - Perinatal pathology / Autopsy
- Different test settings
    - Carrier Screening
    - Pre-implantation Genetic Diagnosis
    - Prenatal Diagnosis
    - Newborn Screening
    - Pre-symptomatic testing for late onset disorders
- Communicating test results

Clinical Genetics

The trainee should be able to:

- Take a family history, construct a pedigree and analyse it.
- Calculate genetic risks

- Provide basic genetic counseling
  (The trainee should know the basic principles, benefits and impact of genetic counseling)
- Make a referral for specialized genetic counseling/testing where indicated.
  (The trainee should be aware of the different types of genetic services and the types of services available in Sri Lanka)
- Search on- line Internet based genetic knowledge bases.

STATISTICS

Types of date, Measures of central tendency, Measures of variation/ dispersion, Grouped date, presentation of date, probability, Distributions (normal and skewed distributions), Confidence intervals, Hypothesis testing, Standard Normal Deviate, Students t-tests, paired t-tests, chi-square test, Correlation, Regression, Sampling, Type I and Type II errors, Significance levels, p-values.

EPIDEMIOLOGY

Descriptive and analytic epidemiology, Measures of disease frequency, Measures of association/risk, Epidemiological Study Designs, Screening tests, evaluation of screening tests, Reliability, Validity, sensitivity, specificity, positive predictive value, negative predictive value, ethics in epidemiological studies.

RADIOLOGY

The Objectives are

1 The trainee hould have the basic knowledge of Radiological investigations and their principles
2 The indications for imaging
3. To be able to interpret common abnormalities which ophthalmologist need to detect to be able to decide on further management of the patient
4. Should have the adequate knowledge on following imaging modalities
    a. Plane film Radiography
    b. Contrast studies
    c. ultrasound Scanning including colour Doppler Scaning
    d. Nuclear imaging including Positron Emission Tomography
    e. CT scanning including perfusion CT,PET CT,CT angiography
    f. MRI scanning ,MR Angiography,MR Spectoscopy,
    g. Angiography (CT A,MR A, Conventional Angiography)
    h. Digital subtraction Angiography (DSA)
    i. Interventional procedures (Angioplasty, Embolisation)

Annex 4

SYLLABUS IN OPTICS AND REFRACTION

1. Physical Optics

1.1. Wave Theory
1.2. Photon Aspects Of Light
1.3. Interference And Coherence
Applications of Interference and Coherence
1.4. Polarization
Applications of Polarization
1.5. Reflection
Application of Reflection
1.6. Transmission and Absorption
1.7. Diffraction
Applications of Diffraction
1.8. Scattering
Applications of Light Scattering
1.9. Illumination
Brightness and Irradiance
1.10. Light Hazards
1.11. Laser Fundamentals
Properties of Laser Light
Elements of a Laser
Laser Sources
Laser- Tissue Interactions

2. Geometric Optics

2.1. Pinhole Imaging
2.2. Imaging With Lenses And Mirrors
2.3. Object Characteristics
2.4. Image Characteristics
Magnification
Image Location
Depth of Focus
Image Quality
2.5. Light Propagation.
Optical Media and Refractive Index
Law of Rectilinear Propagation
Optical Interfaces
Specular Reflection: Law of Reflection
Specular Transmission: Law of Refraction
Normal Incidence
Total Internal Reflection
Dispersion
Reflection and Refraction at Curved Surfaces
The Fermat Principle
Stigmatic Imaging Using a Single Refracting Surface

2.6. First- Order Optics
- Ignoring Image Quality
- Paraxial Approzximation
- Small- Angle Approximation
- The Lensmaker's Equation

2.7. Ophthalmic Lenses
- Transverse Magnification for a Single Spherical Refracting Surface
- Thin- Lens Approximation
- Lens Combinations
- Virtual Images and Objects
- Focal Points and Planes
- Paraxial Ray Tracing Through Convex Spherical Lenses
- Objects and Images at Infinity
- Principal Planes and Points
- Modeling an Unknown Optical System
- Thick Lenses
- Focal Lengths
- Gaussian Reduction
- Knapp's Low, The Badal Principle, And the Lens meter
- Afocal Systems

2.8. Ophthalmic Prisms
- Plane Parallel Plate
- Angle of Deviation
- Prism Diopter
- Displacement of Images by Prisms
- Prismatic Effect of Lenses (The Prentics Rule)
- Vector Addition of Prisms
- Fresnel Prisms

2.9. Mirrors
- Reflecting Power
- Reversal of Image Space
- Central Ray for Mirrors
- Vergence Calculation

2.10.Optical Aberrations
- Regular Astigmatism
- Transposition
- Combining Spherocylindrical Lenses
- Combining Cylinders at Oblique Axes
- Spherical Aberration
- Chromatic Aberration

3. CLINICAL OPTICS

Optics of the Human Eye
- The Human Eye as an Optical System
- Schematic Eyes
- Important Axes of the Eye
- Pupil Size and Its Effect on Visual Resolution

Visual Acuity
Contrast Sensitivity and the Contrast Sensitivity Function
Refractive States of the Eyes
Binocular States of the Eyes
Accommodation and Presbyopia
Epidemiology of Refractive Errors
Developmental Myopia
Developmental Hyperopia
Prevention of Refractive Errors
Treatment of Refractive Errors

4. Clinical Refraction

4.1.Objective Refraction: Retinoscopy
Positioning and Alignment
Fixation and Fogging
The Retinal Reflex
The Correcting Lens
Finding Neutrality
Retinoscopy of Regular Astigmatism
Aberrations of the Retinoscopic Reflex
Summary of Retinoscopy

4.2.Subjective Refraction Techniques
Astigmatic Dial Techniques
Cross- Cylinder Technique
Refining the Sphere
Binocular Balance

4.3.Cycloplegic And Noncycloplegic (Manifest) Refraction

4.4.Overrefraction

4.5.Spectacle Correction Of Ametropias
Spherical Correction of Ametropias
Vertex Distance
Cylindrical Correcting Lenses and the Far Point Concept

4.7.Prescribing For Children
Myopia
Hyperopia
Anisometropia

4.7.Clinical Accommodative Problems
Presbyopia
Accommodative Insufficiency
Accommodative Excess
Accoomodative Convergence / Accommodation Ratio
Effect of Spectacle and Contact Lens Correction on Accommodation and Convergence

4.8.Prescribing Multifocal Lenses
- Determining the Power of a Bifocal Add
- Types of Bifocal Lenses
- Trifocal Lenses
- Progressive Addition Lenses
- The Prentice Rule and Bifocal Design
- Occupation and Bifocal Segment

4.9.Prescribing Special Lenses
- Aphakic Lenses
- Absorptive Lenses
- Special Lens Materials
- Therapeutic Use of Prisms

4.10. Monocular Diplopia

5. Contact Lenses

5.1.Contact Lens Glossary

5.2.Clinically Important Features Of Contact Lens Optics
- Field Of Vision
- Image Size
- Accommodation
- Convergence Demands
- Tear Lens
- Correcting Astigmatism
- Correcting Presbyopia

5.3.Contact Lens Materials And Manufacturing
- Materials
- Manufacturing

5.4.Patient Examination And Contact Lens Selection
- Patient Examination
- Contact Lens Selection

5.5.Contact Lens Fitting
- Soft Contact Lenses
- RGP Contact Lenses
- Toric Soft Contact Lenses
- Contact Lenses for Presbyopia
- Kerotoconus and the Abnormal Cornea
- Gas- Permeable Scleral Contact Lenses

5.6.Therapeutic Lens Usage

5.7.Orthokeratology And Corneal Reshaping

5.8.Custom Contact Lenses And Wave front Technology

5.9.Contact Lens Care And Solutions

5.10. Contact Lens – Related Problems And Complication
Cornea
The Red Eye
HIV Transmission in Contact Lens Care

5.11. Pederal Law And Contact Lenses

6. Intraocular Lenses

6.1.Intraocular Lens Designs
Classification
Background
Posterior Chamber Lenses
Anterior Chamber Lenses

6.2.Optical Considerations For IOLs
IOL Power Calculation
Piggyback IOLs

6.3.IOL Power Calculation After Corneal Refractive Surgery
Instrument Error
Index Of Refraction Error
Formula Error
Power Calculation Methods for The Postkeratorefractive Eye

6.4.IOL Power In Corneal Transplant Eyes
6.5.Silicone Oil Eyes
6.6.Image Magnification
6.7.Lens – Related Visual Disturbances
6.8.Non spherical Optics
6.9.Multifocal IOLs
Types of Multifocal IOLs
Clinical Results of Multifocal IOLs
Accommodating IOLs
6.10 IOL Standards

7. Optic Considerations in Refractive Surgery

7.1.Corneal Shape
7.2.Angle Kappa
7.3.Pupil Size
7.4.Irregular Astigmatism
Wave front Analysis
Causes of Irregular Astigmatism

8. Telescopes and Optical Instruments

Direct Ophthalmoscope
8.2.Indirect Ophthalmoscope
Optics of Fundus Image Formation
Aerial Image
Conjugacy of Pupils
Fundus Illumination
Binocular Observation

8.3.Fundus Camera
8.4.Slit- Lamp Biomicroscope
Slit-Lamp Fundus Lenses
8.5.Goldmann Applantation Tonometer
8.6.Dynamic Contour Tonometry
8.7.Pachymeter
8.8.Specular Microscope
8.9.Operating Microscope
8.10.Keratometer
8.11.Corneal Topographer
8.12.Manual Lensmeter
Measuring the Bifocal Add
8.13.Automatic Lensmeter
8.14.Diagnostic Ultrasonography
8.15.Automated Refraction
8.16.Macular Function Testing
Laser Interferometer
Potential Acuity Meter
8.17.Glare Testing
Wave front Aberrometers
Optical Coherence Tomography

9. Vision Rehabilitation & Low vision

9.1.Epidemiology of Vision Impairment
9.2.Important Definitions In Low Vision
Legal Blindness
Low Vision
Visual Function
9.3.Classification Of Visual Function Deficits
Cloudy Media
Central Visual Field Deficit
Peripheral Visual Field Deficit
9.4.Patient Assessment
Functional History
Well-Being
Measuring Visual Function
9.5.Helping Patients Function Better
Refraction
Distance Spectacles
Optical Aids Providing Magnification
Prisms
Nonoptical Aids
9.6.Contrast Enhancement
9.7.Lighting And Glare Control
9.8.Instruction And Training
9.9.Counseling And Support Groups
9.10.Vision Rehabilitation Professionals And Services
9.11.Levels Of Vision Rehabilitation Services

9.12.Pediatric Low Vision Issues
- Infants
- Preschool Children
- Kindergartners to Preadolescents
- Teenagers

9.13.Barrier Free Accessibility for visually disabled

Some of the texts recommended

Annex 5

SYLLABUS - MD OPHTHALMOLOGY

Applied Basic Sciences

The candidate should be fully conversant with the Structure and the functions of the normal eye, ocular adenexia , orbit and the visual pathway.

Slit lamp examination with tonometry
V/A assessment, basic examination techniques and principals of assessments of eye and adenexia
Basic principles and application of Lasers
Special examination techniques and interpretation like 3 mirror goniscopy 90D , 78D indirect ophthalmoscope
Special investigation techniques like FFA , ICG , U/ S Scan, Corneal Scan, Humpry Field Analysis , OCT, GDX etc.
Orthoptic assessment , ocular motility assessments and its interpretation

Preoperative assessments
General medical, anaesthetic, ophthalmic

Operating theatre practises
Aseptic techniques, sterilisation and disinfection
Surgical aspect of local and general anaesthesia

Pharmacological and therapeutic agents
Antibiotics, antiviral, antifungal principals and practises
Corticosteroids, immunosuppressive therapy
Ophthalmic pharmacological and therapeutic agents
Irrigating solutions used in ophthalmic practice, viscoelastics

Basic Ophthalmic Surgical Practises
Instruments and suture materials
Equipments - cryo machine, phaco emulsification machine, vitrectomy machine ,endoscope, Indirect LASER delivery system, Orbital drill system
Suturing methods
Nasolacrimal duct canulalition

CLINICAL OPHTHALOMOLOGY
Orbit and ocular adenexia
Comprehensive knowledge of medical and surgical ophthalmology in relation to Orbit, lids , adenexia including lacrimal gland, lacrimal drainage apparatus and paranasal sinuses
Abnormal lid positions/lid swelling
Orbital swelling
Liaison with neurosurgeon / ENT /Plastic surgeon/faciomaxillary / endocrinologist
Surgical skills in relation to lids orbit, and adenexia (under supervision until they are proficient)
watering eye
Syringing and probing

Incision and curettage of chalazia
Biopsy of lid lumps
Involutional entropian and ectropian
DCR
Canalicular repair
Enucleation and evisceration

Lid carcinomas
Cicatricial malpositions of the lids
Ptosis correction
Orbital and lacrimal tumours, surgical approaches /treatment
Orbital prosthetic implants
Exenteration
Diseases of the paranasal sinuses
Use of imaging(CT / MRI / X RAY) and interpretation

EXTERNAL EYE DISEAES , SCLERA CORNEA and ANTERIOR UVEA

Infectious external eye disease
Infective keratitis
Intersticial keratitis
Dry eye
Allergic and atopic eye disease
Corneal ectasia/ opacity
Complications of contact lens use
Acid and alkali burns
Corneal dystrophies
Pterygia
Keratoconus
Aniridia and other anterior segment dysgenisis
Autoimmune corneal and sclera diseases including peripheral ulcerative keratitis
Fuch's heterochromic cyclitis
Episcleritis and scleritis

Need to gain related surgical skills -
Corneal scraping and cytology
Amniotic membrane grafting
Keratoplasty – penetrating/ DALK/endothelial
Refractive surgical procedures
Collagen cross linking procedure
Excision of the pterygium and conjunctival grafting
Conjuctival and uveal tumours
Stem cell graft
Immunosuppressive therapy –indications and follow up

DISORDERS OF LENS , ZONULES , CILLIARY BODY

Disorders of accommodation and refractive errors
Opacifications of lens
Pseudoexfoliation of the lens capsule
Lens subluxation

Practical skills
To have undertaken (under supervision until proficient) the following -
Phacoemulsification with IOL implantation
Management of intra operative complications (Posterior capsular rupture, lens fragement dislocation)
Extra capsular cataract surgery and lens implantation
Dislocated /subluxed lens
ectopia lentis (Diseases related to that)

Alternatives to capsular bag IOL insertion
Combined cataract and glaucoma / corneal transplantation procedures

IOL design and lens materials
Calculation of intra ocular lens power
Fluidics and ultrasonics of phacoemulsification machines

DISORDERS OF AQUEOUS PRODUCTION AND DRAINAGE

Glaucoma suspects
Different types of Glaucomas
Medical management including their side effects
Glaucoma drainage surgery indications, complications and their management
Ocular Hypotony
Ciliary body ablation

Practical skills
Intra ocular pressure measurement techniques
Assessment of anterior chamber depth
Optic disk assessment
Interpretation of visual fields

VITREORETINAL DISORDERS

Should be familiar with the following conditions:
Vitreous detachments and degenerations
Recognition of retinal degenerations and brakes
Vitreous haemorrhage and management
Vaso ploriferative Vitreoretinopathies
Retinopathy of prematurity

Recognition of intra ocular foreign body
Retinal detachment classification pre disposing factors recognition of emergency situations and recognition of proliferative vitreoretinopathy
Should gain practical skills in indirect ophthalmoscopy with sclera indentation, retinal drawings

on Vitreoretinal surgery, removal of intra ocular foreign body, management of Endophthalmitis.

Medical Retinal and Choroidal disorder

Diabetic retinopathy screening classification and management
Hypertensive retinopathy
Retinal vascular occlusions
Macular diseases, should be familiar with assessment of macular functions
Hereditary retinal diseases
Intra ocular malignancies
Uveitis, vaculities and its causes
Other retinal telangiectasias
Melanoma,Naevas, Haemangiomas

MEDICINE IN RELATION TO OPHTHALMOLOGY

Should have knowledge on ophthalmic manifestations and updates on treatments on following medical conditions .

Infectious diseases
Hyper tension
Cerabro vascular disease
Cardio vascular disease
Hypercholesterolemia
Haematological disease
Rheumatoid disease
Endocrime disorders
Malignancies and recent development with regard to radiotherapy and chemotherapy
Effects of drugs on visual functions

NEUROLOGY IN RELATION TO OPHTHALMOLOGY

Should be able to recognize optic disk abnormalities and differential diagnosis
Optic atrophy
Visual pathway disorders
Liaison with the neurologists, Neuro surgeon, endocrinologist
Should have the practical skills on examination of cranial nerves, assessments of cerebellar functions , visual field testing and temporal artery biopsy
Need awareness of space occupying lesions and demyelisation disorders and higher cortical dysfunction
Evaluation of a patient with headache and facial pain
Ocular motility disorders including aberrant regeneration
Use of Botulinem toxin

Should be familiar with the strabismus different types
Evaluation of eye movements
Recognition of ocular myopathies and other disorders involving neuro muscular junction and supra nuclear eye movement disorders

DISEASES AFFECTING CHILDREN

Should be familiar with visual assessment in children
Congenital abnormalities
Ametropia in children
Squints classification and management
Amblyopia classification and management
Liaison with paediatricians and geneticists
Need background knowledge of congenital disorders like nystagmus, ocular albinism, Glaucoma, cataracts, leucocoria, genetic and development disorders, intra ocular and orbital disorders in children
Anterior chamber and angle with anterior segment dysgenesis
Disorders of Vitreous and retina
Surgical skills in strabismus surgery
ROP screening familiar with International classification, Babies at risk, Management,skills in ROP screening
Primary and secondary tumours affecting eye
Congenital disorders of Lacrimal drainage Apparaters

TRAUMA

Trainee must have sound knowledge of the assessments and management of
Faciomaxillary injuries including orbital fractures and damage to lacrimal draining apparates
lid lacerations
penetrating injuries of cornea ,sclera
hyphaema, vitreous haemorrhage
lens dislocations/subluxation
intra ocular foreign body
Posterior segment manifestations of blunt trauma
traumatic optic neuropathy
orbital foreign body
endophthalmitis
Ocular hypotony
Sympathatic Ophthalmitis

OPHTHALMIC PATHOLOGY

Ophthalmic Pathology

1. Familiarity with common disease process in relation to pathogenesis and morphological features.

2. Knowledge of general Pathology especially in relation to wound healing: cornea , sclera and other ocular structures.

3. Familiarity with Specimen handling.
    - Communication with laboratory
    - Fixation , orientation of specimens.
    - Gross dissection of ocular specimens.
    - Processing and staining of tissue.

4. Knowledge about basic scientific concept of staining and other special investigations use in histopathology.

5. Knowledge about application of ancillary investigations in tissue diagnosis of diseases such as Immunohistochemistry,Molecular pathology and Electron microscopy.

6. Knowledge about pathology of common inflammatory diseases of eye.

7. Knowledge about pathology of common neoplastic conditions in eye and related structures.This include intraocular, extra ocular neoplastic conditions both primary and secondary.

8. Ability to identify the tissue and pathological process of H& E stain slides of biopsy specimens of above mentioned (6&7) conditions and describe the histological findings.

GENETICS

The trainee should have the satisfactory knowledge of the following:

Dysmorphology / congenital abnormalities
Inborn errors of metabolism
Teratogenesis
Mutagenesis
Carcinogenesis
DNA finger printing
Paternity testing
Genetherapy

SPECIAL TOPICS IN OPHTHALMOGENETICS
The trainee should acquire knowledge in the following:

- Genetics of blindness
- Genetics of in born errors of metabolism with ocular manifestations
- Chromosomal disorders with ocular manifestations
- Genetically determined disorders of the:
    - Globe
    - Anterior segment
    - Lens
    - Retina
    - Choroid
    - Optic nerve
    - Ocular adnexae
    - Face
    - Cranium

- Genetic factors in:
    - Glaucoma
    - Refractive errors
    - Squint
    - Colour vision

Annex 7

PEER TEAM RATING (PTR)

PTR FORM C

(Rater Assessment 1-20)

PGIM Roll No. (DD/MM/YY)

Date of assessment
Year training

PGIM /						/			-								○ 1 ○ 2 ○ 3 ○ 4 ○ 5 ○ 6

Name of Rater

(You can remain Anonymous)

Please indicate your profession by filling in one of the following circles

○ Consultant ○ Registrars ○ SHO or HO ○ Other Specify

○ Allied Health Professional ○ SR ○ Clerical or Secretarial Staff ……

Please mark one of the circles for each component of the exercise on a scale of 1 (extremely poor) to 9 (extremely good). A score of 1-3 is considered unsatisfactory, 4-6 satisfactory and 7-9 is considered above that expected, for a trainee at the same stage of training and level of experience. Please note that your scoring should reflect the performance of the trainee against that which you would reasonably expect at their stage of training and level of experience. You must justify each score of 1-3 with at least one explanation/example in the comments box, failure to do will invalidate the assessment. Please feel free to add any other relevant opinions about this doctor's strengths and weaknesses.

THE PTR IS NOT AN ASSESSMENT OF KNOWLEDGE OR PRACTICAL SKILLS

1. Attitude to staff: Respects and values contributions of other members of the team			
○ Don't know	○ 1 ○ 2 ○ 3 UNSATISFACTORY	○ 4 ○ 5 ○ 6 SATISFACTORY	○ 7 ○ 8 ○ 9 ABOVE EXPECTED
2. Attitude to patients; Respects the rights, choices, beliefs and confidentiality of patients			
○ Don't know	○ 1 ○ 2 ○ 3 UNSATISFACTORY	○ 4 ○ 5 ○ 6 SATISFACTORY	○ 7 ○ 8 ○ 9 ABOVE EXPECTED
3. Reliability and punctuality			
○ Don't know	○ 1 ○ 2 ○ 3 UNSATISFACTORY	○ 4 ○ 5 ○ 6 SATISFACTORY	○ 7 ○ 8 ○ 9 ABOVE EXPECTED

4. Communication skills: communicates effectively with patients and families			
○ Don't know	○ 1 ○ 2 ○ 3	○ 4 ○ 5 ○ 6	○ 7 ○ 8 ○ 9
	UNSATISFACTORY	SATISFACTORY	ABOVE EXPECTED
5. Communication skills: communicates effectively with healthcare professionals			
○ Don't know	○ 1 ○ 2 ○ 3	○ 4 ○ 5 ○ 6	○ 7 ○ 8 ○ 9
	UNSATISFACTORY	SATISFACTORY	ABOVE EXPECTED
6. Honesty and Integrity, do you have any concerns? ○ **Yes** ○ **No**			
7. Team player skills: Supportive and accepts appropriate responsibility; Approachable			
○ Don't know	○ 1 ○ 2 ○ 3	○ 4 ○ 5 ○ 6	○ 7 ○ 8 ○ 9
	UNSATISFACTORY	SATISFACTORY	ABOVE EXPECTED
8. Leadership skills: Takes responsibility for own actions and actions of the team			
○ Don't know	○ **1** ○ **2** ○ **3**	○ **4** ○ **5** ○ **6**	○ **7** ○ **8** ○ **9**
	UNSATISFACTORY	SATISFACTORY	ABOVE EXPECTED
9. OVERALL PROFESSIONAL COMPETENCE			
○ Don't know	○ **1** ○ **2** ○ **3**	○ **4** ○ **5** ○ **6**	○ **7** ○ **8** ○ **9**
	UNSATISFACTORY	SATISFACTORY	ABOVE EXPECTED

Comments about the trainee (BLOCK CAPITALS PLEASE) – Write in English/ Sinhala/ Tamil

Your (You can remain Anonymous) **Signature:**

Please place form in the attached self addressed envelope and return to the PGIM (PTMU) named on the envelope. DO <u>NOT return to the Registrar or Senior Registrar</u>.
We are very grateful for your independent and honest rating our all trainees.

Annex 8

Pre MD Training Portfolio: During years 1-3 of the **Pre MD Training**

The main content areas of the Pre MD Training Portfolio shall include the following, authenticated by the Supervisor/Trainer:

- Log of Clinical activities (minimum number and skill level of procedures which should be carried out are given)
- Reflective Practice (on significant clinical events experienced by the trainee and 6 out of 10 specified topics) -
- Teaching (undergraduates / ophthalmic nurses/ ophthalmic technologist / Primary Health care workers)
- Research and Audit
- Ethics and Medico-legal Issues
- Professional Development
- Record of attendance at essential courses
- Record of experience obtained in tutorials, journal clubs, Clinico-pathological Conferences and audits
- Self-assessment of the Training/Acquisition of clinical experience by the Trainee
- Assessment of the Trainee's progress by the Educational supervisor
  These assessments sho*uld inc*lude:
  Mini Clinical Evaluation Exercises
  Case-Based Discussions
  Objective Structured Assessments of Technical Skills
  Peer Team Ratings

And Other

Trainees are expected to maintain a surgical log book details as an annex certified by the supervising consultant during this period

Annex 9

Exam Format and Marking Scheme Ophthalmic Basic Sciences Examination

A) Format of the examination

This examination shall consist of the following two subjects

A. **Ocular Anatomy, Radiology and Genetics**(considered as one)

B. **Ocular Physiology, basics in ophthalmic Pathology and Epidemiology** (considered as one)

Each of the above two subjects shall have the following components (C)

C 1 MCQ paper
C 2 Structured Essay paper
C 3 Oral / Viva Voce Examination

Ocular Anatomy, Radiology and Genetics

C1. Multiple Choice Questions: 30 questions of the multiple true/false (MTF) type to be answered in 1 hour. Some of these questions may be replaced with single best response type of questions.
C2. Structured Essay Questions: 3 questions to be answered in 1 ½ hour
C3. Structured Oral / Viva voce examination: of 20 minutes duration, conducted by a panel consisting of two consultant Ophthalmologists

Ocular Physiology, basics in ophthalmic Pathology and Epidemiology

C1. Multiple Choice Questions: 30 questions of the multiple true/false (MTF) type to be answered in 1 hour. Some of these questions may be replaced with single best response type of questions.
C2. Structured Essay Questions: 3 questions to be answered in 1 ½ hour
C3. Structured Oral / Viva voce examination: of 20 minutes duration, conducted by a panel consisting of two consultant Ophthalmologists

B. Marking Schemes

MCQ papers:

MCQs in both subjects will be given as one paper.

Each question will have 5 responses and will carry 5 marks. One mark for each correct answer and one minus mark for each incorrect answer will be awarded. Negative marks of the individual MCQ questions will **not** be carried over to other questions. The lowest mark for a given question will be zero.

The total marks obtained per subject will be calculated and converted to a percentage mark out of 100. This will be subsequently converted to a closed mark according to the scale given (range 10-29) in **annexure 1**.

Structured Essay Questions

The 6 questions pertaining to the two subjects shall be given as one paper, to be answered in 3 hours.

Each question will be marked independently by 2 examiners, according to a pre-set model answer and marking grid.

1) For each part of a question, the weight age of marks is to be indicated as a percentage at the time of setting of the paper by the examiners and indicated in the question paper.

Eg: Q1 - a) - 50%
b) - 35%
c) - 15%

2) Each part question is to be marked using **0-100 scale.**

BF - BAD FAILURE	----------	0-<40
MF-MARGINAL FAILURE	----------	≥40-<60
P-PASS	----------	≥60-<80
EP-EXCELLENT PASS	----------	≥80-≥100

3) The mark obtained for each part of a question should be multiplied by percentage allocated for that part and the results should be added up

Eg: Q1 a) 60 - 50% - 30
b) 70- 35% - 24.5
c) 60 - 15% 09
63.5

4) The mark obtained for each question awarded by the 2 examiners are averaged to obtain the final mark for each question

Eg Q1 Examiner 1 63.5
Examiner 2 62.5
Final mark for Q1 63.0

5) Add marks for all three questions in each subject and divide by the number of questions (i.e3) (Average)

Eg: question paper with 3 questions:
Q1) 63.0
Q2) 60
Q3) 80
Average 67.67

6) This calculation would be performed for each of the two subjects separately to obtain the raw mark for the structured essay paper in each subject.

7. This raw mark for the structured essay paper is converted to the closed mark using the grid given in annexure 2.

Viva voce examination

Each viva will be marked independently by the 2 examiners using the closed marking scale ranging from 10 to 29 according to the guide given in Annexure 3. These would be averaged for each of the two subjects (Ocular Anatomy, Radiology, Genetics and Ocular Physiology, basics in Ocular Pathology, Epidemiology) separately to give the final mark for the viva (for each subject).

If there is a discrepancy of more than 3 between the closed marks given by the two relevant examiners, either in the structured essay paper or in the Viva Voce Examination they should review the given marks along with the chief examiner.

Calculation of final mark for each subject

The closed marks of the three components of each subject will be added and divided by 3 in order to derive the final closed mark for the subject.

C. Requirements to Pass the Ophthalmic Basic Sciences examination

1. **In order to pass a subject**, a candidate must:

   Obtain a minimum closed mark of 20 for that subject (a grade of **PASS - P** or an **EXCELLENT PASS – EP**

   And

   Not obtain more than one closed mark of less than 20 in the 3 components (MCQ, Essay and Viva.)

   And

   Not obtain a closed mark of less than 15 in either the essay or the MCQ component.

2. **To pass the examination**, a candidate must obtain passes in the two subjects in one and the same examination.

D. Ranking of candidates

Ranking of candidates will be based on the aggregate of the closed marks of all the subjects. The number of attempts will be considered and those who pass in a fewer number of attempts being placed above others.

The MCQ numeric mark expressed as a percentage (Rounded to the nearest Integer) shall be converted to the closed mark and grade according to the grid below

PERCENTAGE MARK	CLOSED MARK	GRADE
≤41	10	
42-43	11	
44-45	12	BAD FAILURE -BF
46-47	13	
48-49	14	
50-51	15	
52-53	16	
54-55	17	MARGINAL FAILURE-MF
56-57	18	
58-59	19	
60-61	20	
62-63	21	
64-65	22	PASS-P
66-67	23	
68-69	24	
70-71	25	
72-73	26	
74-75	27	EXCELLENT PASS-EP
76-77	28	
≥78	29	

Conversion of raw marks of the structured essay to closed marking scheme.

	Raw mark	Final mark
1. BF- Bad failure (0-<40)	0-<8	10
	≥8-<16	11
	≥16-<24	12
	≥24-<32	13
	≥32->40	14
2. MF- Marginal failure (≥40-<60)	≥40-<44	15
	≥44-<48	16
	≥48-<52	17
	≥52-<56	18
	≥56-<60	19
3. P- Pass (≥60-<80)	≥60-<64	20
	≥64-<68	21
	≥68-<72	22
	≥72-<76	23
	≥76-<80	24
4. EP – Excellent pass (≥80-100)	≤80-<84	25
	≥84-<88	26
	≥88-<92	27
	≥92-<96	28
	≥96-≤100	29

Guidelines for the award of grades for Viva Voce examination

Grade		**closed marks- range**
BF - BAD FAILURE	----------	≥10 < 15
MF- MARGINAL FAILURE	----------	≥15 < 20
P - PASS	----------	≥ 20 < 25
EP - EXCELLENT PASS	----------	≥ 25 ≤ 29

Grade	**General descriptors**	**Specific descriptors**
Bad failure -BF **(Major deficiency)**	**Major deficiencies in knowledge and/or in application of knowledge.**	**Knowledge and judgment-**poor basic knowledge and judgment/understanding to a level of concern. **Quality of response-**disorganized and confused; prompts by the examiners do not work(not persuadable)
Marginal failure-MF **(Minor deficiency)**	**-Deficiency in knowledge and in application of knowledge** **-At least two areas that the examiner considers weakand/or overall ability (application of knowledge) not up to the mark**	**Knowledge and judgment-**gaps in knowledge/ difficulty in prioritizing/ struggle to apply knowledge. **Quality of response-**hesitant and indecisive answers; frequent prompting
Pass–P **Deficiencies can be self-corrected or no deficiency**	**No obvious knowledge deficiency** -application of knowledge and practical aspect are acceptable. -deficiencies are such that the examiner could reasonably conclude that the candidate can self-correct them.	**Knowledge and judgment-**Good knowledge and judgment of common problems. Ability to prioritize. **Quality of response** Logical answer with good supporting evidence; prompting limited to aspects related to literature
Excellent Pass -EP **(shows extra ability)**	**Above average** **-**shows extra ability in knowledge and /or in application of knowledge -outstanding ability to clearly vocalize the thought process.	**Knowledge and judgment-** Exceptionally good knowledge and judgment Excellent understanding of breadth and depth of a topic,able to quote from literature **Quality of response-**Confident, clear,logical and focused answers No prompting necessary

Annex 10

MD (Ophthalmology) Optics and Refraction Examination

A. Format of the examination

This examination shall consist of three components (C)

C1. Multiple Choice Questions: 45 questions of the multiple true/false (MTF) type to be answered in 1 ½ hours. Some of these questions may be replaced with single best response type of questions.
C2. Structured Essay Questions: 4 questions to be answered in 2 hours
C3. Refraction - Clinicals (2 cases, 30 minutes) and Structured Oral / Viva voce examination (15 minutes duration), conducted by a panel of two examiners. **(Compulsory to pass)**

B. Marking Schemes

MCQ papers:
Each question will have 5 responses and will carry 5 marks. One mark for each correct answer and one minus mark for each incorrect answer will be awarded. Negative marks of the individual MCQ questions will **not** be carried over to other questions. The lowest mark for a given question will be zero.

The total marks obtained per subject will be calculated and converted to a percentage mark out of 100. This will be subsequently converted to a closed mark and grade according to the scale given (range 10-29) in **annexure 1**.

Structured Essay Questions

Each question will be marked independently by 2 examiners, according to a pre-set model answer and marking grid.

1) Each part question weightage is to be indicated as a percentage at the time of setting of the paper by the examiners and indicated in the question paper.

Eg: Q1 - a) -50%
b) - 35%
c) - 15%

2. Each part question is to be marked using **0-100 scale.**

BF - BAD FAILURE	----------	0->40
MF-MARGINAL FAILURE	----------	≥40-<60
P-PASS	----------	≥60-<80
EP-EXCELLENT PASS	----------	≥80-≥100

3) The marks obtained for each part of a question should be multiplied by percentage allocated for that part and the result should be added up

Eg: Q1	a) 60 - 50% -	30
	b) 70- 35% -	24.5
	c) 60 - 15%	09
		63.5

4) The mark obtained for each question awarded by the 2 examiners are averaged to obtain the raw mark for each question

Eg Q1	Examiner 1	63.5
	Examiner 2	62.5
	Final mark for Q1	63.0

5) Add marks for all the questions and divide by the number of questions (ie:4)
Eg: question paper with 4 questions:

Q1)	63.0
Q2)	60
Q3)	80
Q4)	58
Average	65.25

6) This would give the raw mark for the structured essay paper. The raw mark is converted to closed mark using the annexure 2.

Refraction Clinicals and Viva voce examination

Each of the two cases and the viva will be marked independently by the 2 examiners using the closed marking scale ranging from 10 to 29 according to the guide given in Annexure 3. These would be averaged to give the final mark for this component of the examination.

If there is a discrepancy of more than 3 between the closed marks given by the two relevant examiners, either in the structured essay paper or in the Viva Voce Examination they should review the given marks along with the chief examiner.

Calculation of final closed mark

The closed marks of the three components will be added and divided by 3 in order to derive the **final closed mark**.

This final closed mark will be converted to the grade using the same conversion table given in annexure 3

BF - BAD FAILURE	----------	$\geq 10 < 15$
MF- MARGINAL FAILURE	----------	$\geq 15 < 20$
P - PASS	----------	$\geq 20 < 25$
EP - EXCELLENT PASS	----------	$\geq 25 \leq 29$

C. Requirements to Pass the MD (Ophthalmology) Optics and Refraction Examination

In order to pass the examination, a candidate must:

Obtain a minimum final closed mark of 20 (a grade of **PASS - P** or an **EXCELLENT PASS – EP**

And

Obtain a minimum closed mark of 20 for Refraction-Clinicals and Structured Oral / Viva voce examination component

And

Not obtain more than one closed mark of less than 20 in the other two components (MCQ, and Structured Essay)

And

Not obtain a closed mark of less than 15 in either the MCQ or the Structured Essay component.

The MCQ numeric mark expressed as a percentage (Rounded to the nearest Integer) shall be converted to the closed mark and grade according to the grid below

PERCENTAGE MARK	CLOSED MARK	GRADE
≤41	10	
42-43	11	
44-45	12	BAD FAILURE -BF
46-47	13	
48-49	14	
50-51	15	
52-53	16	
54-55	17	MARGINAL FAILURE-MF
56-57	18	
58-59	19	
60-61	20	
62-63	21	
64-65	22	PASS-P
66-67	23	
68-69	24	
70-71	25	
72-73	26	
74-75	27	EXCELLENT PASS-EP
76-77	28	
≥78	29	

Conversion of raw marks of the structured essay to closed marking scheme.

	Raw mark	Final mark
1. BF- Bad failure (0->40)	0-<8	10
	≥8-<15	11
	≥15-<23	12
	≥23-<31	13
	≥31->40	14
2. MF- Marginal failure (≥40->60)	≥40-<44	15
	≥44-<48	16
	≥48-<52	17
	≥52-<56	18
	≥56-<60	19
3. P- Pass (≥60-<80)	≥60-<64	20
	≥64-<68	21
	≥68-<72	22
	≥72-<76	23
	≥76-<80	24
4. EP – Excellent pass	≥80-<84	25
	≥84-<88	26
	≥88-<92	27
	≥92-<96	28
	≥96-≤100	29

Guidelines for the award of grades for structured Viva Voce examination

Grade		**closed marks- range**
BF - BAD FAILURE	----------	≥10 < 15
MF- MARGINAL FAILURE	----------	≥15 < 20
P - PASS	----------	≥ 20 < 25
EP - EXCELLENT PASS	----------	≥ 25 ≤ 29

Grade	**General descriptors**	**Specific descriptors**
Bad failure -BF (Major deficiency/unsafe to practice independently)	**-major deficiency in knowledge and application of knowledge** **-deficiencies are sufficient for the examiner to conclude that it is unsafe to practice unsupervised**	**Patient care-** Demonstrated incompetence in the diagnosis and clinical management to a level that the safety of the patient is jeopardized and caused serious concerns to the examiner. **Knowledge and judgment-** poor basic knowledge and judgment/understanding to a level of concern **Quality of response-** disorganized and confused; prompts by the examiners do not work(unpersuadable)
Marginal failure-MF (minor deficiency)	**-Deficiency in knowledge and in application of knowledge** **-at least two areas that the examiner considers weak and/or overall ability (application of knowledge) not up to the mark**	**Patient care-**failed to demonstrate competence in the diagnosis and clinical management **Knowledge and judgment-** gaps in knowledge/difficulty in prioritizing/struggle to apply knowledge **Quality of response-**hesitant and indecisive answers; frequent prompting
Pass–P Deficiencies can be self corrected or no deficiency, suitable for independent practice	**No obvious knowledge deficiency** **-**application of knowledge and practical aspect are acceptable**.** **Or** **-**deficiencies are such that the examiner could reasonably conclude that the candidate can self-correct**.** **Considered safe to allow**	**Patient care-**demonstrated competence and confidence in the diagnosis and clinical management **Knowledge and judgment-** good knowledge and judgment of common problem/ability to prioritize. **Quality of response-**logical

	unsupervised practice	answer with good supporting evidence; prompting limited to aspect related to the literature
Excellent Pass-EP (show extra ability)	**-above average** -shows extra ability in knowledge application of knowledge, and in practical aspects. -outstanding ability to clearly vocalize the thought process.	**Patient care-**demonstrated competence and confidence in the diagnosis and clinical management to a level which would inspire confidence in the patient **Knowledge and judgment-** exceptionally good knowledge, insight and judgment/understanding of breadth and depth of a topic and quoted from literature **Quality of response-** confident, clear, logical and focused answers ;no prompting necessary

Annex 11

MD (Ophthalmology) Examination

A)Format of the examination

This examination shall consist of three sections (S)

S1) Theory -This section consists of 2 components (C)

C.i. Multiple Choice Questions: 60 questions of the multiple true/false (MTF) type to be answered in 2 hours. Some of these questions may be replaced with single best response type of questions.
The weightage attached to this component - ½

C.ii. Structured Essay Questions: 4 questions to be answered in 3 hours. The weightage attachedto this component - ½

S2) Clinicals in Ophthalmology-This section consists of 2 components (C)

C i. Clinicals in Anterior Segment - 30 minutes duration (conducted by a panel of two examiners.one Specialist in Ophthalmology and the external Examiner).The weightage attached to this component - ½

C ii. Clinicals in Posterior Segment– 30 Minutes duration (conducted by a panel of two examiners.one Specialist in Ophthalmology and the external Examiner).The weightage attached to this component - ½

S3) Clinico – orals .This section will consist of 3 components.

C i) Clinicals in Neurology &Medicine in relation to Ophthalmology - duration of 30 minutes (conducted by a panel of three examiners.one Specialist in Ophthalmology and one specialist in either neurology or medicine and the external Examiner).The weightage attachedto this component – 1/3

Cii) Viva voce examination - -Ophthalmic Medicine/Ophthalmic Surgery - duration of 20 minutes (conducted by a panel of two examiners.one Specialist in Ophthalmology and the external Examiner).The weightage attached to this component – 1/3

C iii) consists of 2 sub components

a) Viva voce examination-Basic Sciences in relation to Ophthalmology - duration of 20 minutes (conducted by a panel of two examiners.Two Specialists in Ophthalmology).The weightage attached to this sub component – 1/6

C iii)

b) Viva voce -Ophthalmic Pathology(conducted by a panel of two examiners. one Specialist in Pathology and the external Examiner).The weightage attached to this sub component – 1/6

B) Marking schemes:

Each component will be marked using the following scale varying from 10 – 29 with 4 grades; **detailed descriptors are given in annexure 3**,where each grade will have a range as indicated. Twenty would be the minimum pass mark.

Grade		**Closed marks- Range**
BF -BAD FAILURE	----------	≥10 < 15
MF-MARGINAL FAILURE	----------	≥15 < 20
P-PASS	----------	≥ 20 < 25
EP-EXCELLENT PASS	----------	≥ 25 ≤ 29

B1: MCQ Paper

Each question will have 5 responses and will carry 5 marks. One mark for each correct answer and one minus mark for each incorrect answer will be awarded. Negative marks of the individual MCQ questions will **not** be carried over to other questions. The lowest mark for a given question will be zero.

The total marks obtained will be converted to a percentage mark out of 100. This will be subsequently converted to a closed mark according to the scale given (range 10-29) in **annexure1.** This would be the final closed mark for the MCQ paper

B2: Structured Essay Questions

Each question will be marked independently by 2 examiners, according to a pre-set model answer and marking grid.

1) Each part question weightage is to be indicated as a percentage at the time of setting of the paper by the examiners and indicated in the question paper.

Eg: Q1 - a) -50%
b) - 35%
c) - 15%

2. Each part question is to be marked using **0-100 scale.**

BF - BAD FAILURE	----------	0-<40
MF-MARGINAL FAILURE	----------	≥40-<60
P-PASS	----------	≥60-<80
EP-EXCELLENT PASS	----------	≥80-≥100

3) The marks obtained for each part of a question should be multiplied by percentage allocated for that part and the result should be added up

Eg: Q1	a) 60 - 50% -	30
	b) 70- 35% -	24.5
	c) 60 - 15%	09
		63.5

4) The mark obtained for each question by the 2 examiners are averaged to obtain theraw mark for each question

Eg Q1	Examiner 1	63.5
	Examiner 2	62.5
	Raw mark for Q1	63.0

5) Add raw marks for all the questions and divide by the number of questions (ie: 4)
Eg: question paper with 4 questions:

Q1)	61.0
Q2)	70.0
Q3)	63.0
Q4)	59.0
Average	63.25

5. This raw mark for the structured essay paper is converted to the closed mark using the grid given in annexure 2.

B 3) Clinicals in Ophthalmology (Anterior and posterior segments)

The two examiners will mark the candidate independently using the closed marking system ranging from 10-29 according to the guide given in Annexure. These would be averaged to give the final closed mark for each of these components of the examination.

B4) Clinicals in Neurology & Medicine in relation to Ophthalmology

The three examiners will mark the candidate independently using the closed marking system ranging from 10 – 29according to the guide given in Annexure. These would be averaged to give the final closed mark for this component of the examination.

Neurology in relation to Ophthalmology clinicals will be marked by the external examiner,one local Ophthalmologist and one Neurologist
Medicine in relation to Ophthalmology clinicals will be marked by the external examiner one local Ophthalmologist and one Physician)

B5) Viva voce examination-Ophthalmic Medicine / Ophthalmic Surgery

The two examiners will mark the candidate independently using the closed marking system ranging from 10-29 according to the guide given in Annexure. These would be averaged to give the final mark for this component of the examination

B6) a) Viva voceExamination-Basic Sciences in relation to Ophthalmology

The two examiners will mark the candidate independently using the closed marking system ranging from 10-29 according to the guide given in Annexure.

b) Viva voce examination-Ophthalmic Pathology

The two examiners will mark the candidate independently using the closed marking system ranging from 10-29 according to the guide given in Annexure.

All 4 closed marks (2 examiners marks from the Viva voce Examination -Basic Sciences in relation to Ophthalmology and 2 examiners marks from Viva voce examination - Ophthalmic Pathology) are averaged to give the final closed mark for this component

If there is a discrepancy of more than 3 between the closed marks given by the two/three relevant examiners, in any component of the examination they should review the given marks along with the chief examiner.

C) Requirements to pass the MD (Ophthalmology) Examination

1 Theory section

The closed marks of the MCQ component and the theory component are added up and averaged to give the final closed mark for the theory section.

To pass the theory section

The candidate must obtain a minimum average of 20

And

Not obtain a closed mark of less than 15 in either the MCQ or the Structured Essay component.

2 Clinicals in ophthalmology section

The marks of the two components in Clinicals of ophthalmology(Anterior and posteriorsegment)are added up and divided by 2 (average) to give the final closed mark for this section

To pass the Clinicals in ophthalmology section

The candidate must obtain a minimum average of 20

And

Not obtain a closed mark of less than 15 in either component

3. Clinico – Oral section

The marks obtained for the 3 components are averaged to give the final closed mark for this section.

To pass Section 3

The candidate must obtain a minimum closed mark of 20

And

Not obtain a closed mark of less than 15 in any component
And

Not obtain more than one closed mark of less than 20 in the three components

4 *<u>To pass the examination the candidate must pass all 3 sections</u>*

D. Ranking

Ranking of candidates will be based on the aggregate of the closed marks of all 3 sections. The number of attempts will be considered and those who pass in a fewer number of attempts being placed above others.

<u>Criteria to award the Dr. P. A. Wirasinha gold medal</u>

Must fulfill all the criteria given below

01. First in the merit order list.
02. First attempt.
03. Two closed marks of 25 or more (Excellent Passes-EP), one of which has to be in a Clinicals in Ophthalmology component.

In the event that more than one candidate fulfills criteria 1, 2 and 3 then the candidate who obtained highest marks in the clinicals in Ophthalmology will be awarded the gold medal.

If there are no candidates fulfilling all the above (1, 2 and 3) criteria the medal will not be awarded.

The MCQ numeric mark expressed as a percentage (Rounded to the nearest Integer) shall be converted to the closed mark and grade according to the grid below

PERCENTAGE MARK	CLOSED MARK	GRADE
≤41	10	BAD FAILURE -BF
42-43	11	
44-45	12	
46-47	13	
48-49	14	
50-51	15	MARGINAL FAILURE-MF
52-53	16	
54-55	17	
56-57	18	
58-59	19	
60-61	20	PASS-P
62-63	21	
64-65	22	
66-67	23	
68-69	24	
70-71	25	EXCELLENT PASS-EP
72-73	26	
74-75	27	
76-77	28	
≥78	29	

Conversion of raw marks of the structured essay to closed marking scheme.

	Raw mark	Final mark
1. BF- Bad failure (0-<40)	0-<8	10
	≥8-<16	11
	≥16-<24	12
	≥24-<32	13
	≥32->40	14
2. MF- Marginal failure (≥40-<60)	≥40-<44	15
	≥44-<48	16
	≥48-<52	17
	≥52-<56	18
	≥56-<60	19
3. P- Pass (≥60-<80)	≥60-<64	20
	≥64-<68	21
	≥68-<72	22
	≥72-<76	23
	≥76-<80	24
4. EP – Excellent pass (≥80-100)	≤80-<84	25
	≥84-<88	26
	≥88-<92	27
	≥92-<96	28
	≥96-≤100	29

Guidelines for the award of grades forclinical and Viva Voce examinations

Grade		**closed marks- range**
BF - BAD FAILURE	----------	≥10 < 15
MF- MARGINAL FAILURE	----------	≥15 < 20
P - PASS	----------	≥ 20 < 25
EP - EXCELLENT PASS	----------	≥ 25 ≤ 29

Grade	**General descriptors**	**Specific descriptors**
Bad failure -BF (Major deficiency/unsafe to practice independently)	**-major deficiency in knowledge and application of knowledge** **-deficiencies are sufficient for the examiner to conclude that it is unsafe to practice unsupervised**	**Patient care-** Demonstrated incompetence in the diagnosis and clinical management to a level that the safety of the patient is jeopardized and caused serious concerns to the examiner. **Knowledge and judgment-** poor basic knowledge and judgment/understanding to a level of concern **Quality of response-** disorganized and confused; prompts by the examiners do not work(unpersuadable)
Marginal failure-MF (minor deficiency)	**-Deficiency in knowledge and in application of knowledge** **-at least two areas that the examiner considers weak and/or overall ability (application of knowledge) not up to the mark**	**Patient care-**failed to demonstrate competence in the diagnosis and clinical management **Knowledge and judgment-** gaps in knowledge/difficulty in prioritizing/struggle to apply knowledge **Quality of response-**hesitant and indecisive answers; frequent prompting
Pass–P Deficiencies can be self corrected or no deficiency, suitable for independent practice	**No obvious knowledge deficiency** **-**application of knowledge and practical aspect are acceptable**.** **Or** **-**deficiencies are such that the examiner could reasonably conclude that the candidate can self-correct**.** **Considered safe to allow**	**Patient care-**demonstrated competence and confidence in the diagnosis and clinical management **Knowledge and judgment-** good knowledge and judgment of common problem/ability to prioritize. **Quality of response-**logical

	unsupervised practice	answer with good supporting evidence; prompting limited to aspect related to the literature
Excellent Pass-EP (show extra ability)	**-above average** -shows extra ability in knowledge application of knowledge, and in practical aspects. -outstanding ability to clearly vocalize the thought process.	**Patient care-**demonstrated competence and confidence in the diagnosis and clinical management to a level which would inspire confidence in the patient **Knowledge and judgment-** exceptionally good knowledge ,insight and judgment/understanding of breadth and depth of a topic and quoted from literature **Quality of response-** confident, clear ,logical and focused answers ;no prompting necessary

Annex: 12

POSTGRADUATE INSTITUTE OF MEDICINE
UNIVERSITY OF COLOMBO, SRI LANKA
ASSESSMENT FORM FOR OVERSEAS/ LOCAL POSTGRADUATE TRAINING

NAME OF TRAINEE : ……
PERIOD OF TRAINING : ……
SPECIALTY : ……
HOSPITAL AND UNIT : ……
COUNTRY : ……
NAME OF THE CONSULTANT : ……

	Excellent	**Good**	**Average**	**Poor**	**Not Applicable**
Theoretical knowledge					
Participation in Educational Activities (Seminars/ workshops/journal club/clinical meetings)					
Research interest					
Clinical decision making					
Clinical skills					
Operative skills					
Ability to cope with emergencies & complications					
Ability to think independently & rationally					
Seeks appropriate consultations					
Ability and willingness to follow instructions					
Quality of documentation					
Dedication to work					
Professionalism and ethical conduct					
Reliability					
Availability/punctuality					
Doctor-patient relationship					
Communication skills					
Relationship with colleagues					
Relationship with other staff					
Supervision & guidance of junior staff					
Teaching of junior and other staff					

ANY OTHER COMMENTS:

_____
_____
_____
_____
_____
_____
_____

……...
SIGNATURE OF TRAINER

Annex 13

TRAINING PORTFOLIO - SECTION II
(POST MD)

POST MD OPHTALMOLOGY
Portfolio

Introduction

Candidates who are successful at the MD (Ophthalmology) Examination are required to complete a further 24 – month period of in-service training: The first 12 month period in Sri Lanka as a Senior Registrar and the following 12 month period at a center abroad. During this 24 month period, the trainee is required to maintain a comprehensive record of training in the form of a portfolio. This is to:
(1)Enable the trainee to reflect on training experiences in clinical ophthalmology and identify and correct any weaknesses in the competencies expected
(2) critically evaluate his/her work
(2) recognize any aspect that needs improvement .Identify how to do these and attend to it.
The Trainer will have regular discussions and ensure that the trainee has satisfactorily acquired the expected competencies.
This training portfolio will be used in the over all evaluation of the trainee's competency to practice independently as a specialist in Ophthalmology at the pre board certification assessment.

Objectives

To be appointed as a Specialist in Ophthalmology to practice independently in Sri Lanka, on completion of the 24 – month period in-service training after the MD (Ophthalmology) Examination:

a) have administrative and organizational skills
b) be able to clearly identify, prioritize and document problems
c) have skills appropriate to a specialist (diagnostic, operative, counselling, risk management, management of medico-legal issues)
d) correct attitudes
e) be able to carry out and also supervise research and clinical audits
f) be committed to Continuous Professional Development
g) be able to disseminate knowledge effectively
h) have adequate knowledge of the English Language and be able to communicate effectively.
i) Should have sound knowledge and skills in Information Technology

Contents

Personal Details

Family Name (Surname):

Fore names:

Address:

Contact telephone No:

Sex:

Date of Birth:

Date and University of Graduation:

Pre-Registration Appointments (Grade/Specialty/Hospital):

Post-Registration Appointments (Grade/Specialty/Hospital):

Date of passing MD Examination 1:

Date of entry to training programme:

Post- MD Appointments (Date/Unit/Hospital/Trainer):

Appointment 1 (Local Training) -

Appointment 2 (Local Training) -

Appointment 3 (Abroad Training) -

Appointment 4 (Abroad Training) -

Hospital Data

	SR App. 1	**SR App. 2**	**SR App. 3**	**SR App. 4**
Male Beds				
Female Beds				
Routine clinics/ week				
Special clinics /week				
Laser Clinics/week				
Casualty admission days/wk				
Number of Registrars				
Number of Senior Registrars				
Cataract Admissions/week				
Total Surgeries / 6 months				
No. of Major Surgeries/6 m				
No. of Miner Surgeries/6 m				
No. of Casualty Surgeries/6m				
No. of Endophthalmitis cases				

GENERAL INSTRUCTIONS

- The portfolio is not a substitute for the log book. The log book continues to be maintained.
- All trainees who enter the ophthalmology post MD training programme with the PGIM should compile a portfolio
- Each entry should be assessed, evaluated discussed with the trainee and help trainee to improve and overcome any short comings by the respective trainer during the period of training under him/her
- Assessment /portfolio viva should be carried out by two assessers. .If there is a disagreement, adjudicator should be brought in. The mentor helps the trainee self evaluate and evaluates daily entries.
- Portfolio viva should be arranged in every 6 months by trainer or mentor, this will be an informal discussion between trainee and mentor. Mentor does not assess.He will actually make sure that the portfolio is maintained satisfactorily.
- If port folio Viva is not up to the required competency level. 03 months should be given to rectify it. It should not affect the board certification date. But board certification should only be given when they are awarded competent level by portfolio assessment.
- portfolios can be paper / Web based
- In portfolio right hand side colour codes can be used to highlight each skill.

Log of surgeries performed independently

Trainee should document the following using the given procedure heading

Procedure		**Minimum number**
1	phacoemulcification	75
2	ECE	5
3	Lens implant in complicated cataract	10
4	Trabeculectomy/ shunts, Valve devises	05
5	Squints	05
6	PKP/DALK	05
7	Oculoplasty procedures (Tarsorrhaphy, Canacular repaires, Amniotic membrane grafting, Stemcell grafting)	10
8	Enucleation	03
9	Repair of Corneal lacerations Scleral lacerations	
10	Laser procedures - a) PI	05
	b) FLT	20
	c) PRP	20
	d) Capsulotomy	10
	e) Vitreolysis	05
	f) Suturelysis	04
	g) Cyclodiode	

11 Indirect Ophthalmoscopy for
- a) diagnostic in children
- b) ROP in babies
- c) cryotherapy /laser

12 Intravitreal injections for
- a) Anti VEGF
- b) Steroids
- c) Antibiotics

12 investigation procedures
- a) OCT
- b) FFA
- c) ICG

13 Local Anesthsia Peribalba .retrobulba.Subtenons

Log Book for Entry of surgeries

Date	Name of Patient	Surgery Details	LA/ GA	Surgeons Name/s	Signature of Trainer

5.1 SURGICAL PROCEDURES PERFORMED INDEPENDENTLY

Example - Trabeculectomy

No	Name	Age	Sex	BHT No / Hospital	Type of surgery	Date of Surgery	Signature of Supervisor
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
25							

Specified tasks

5.2 SUMMARY OF TASKS

Audits- [2]

Research projects- [1]

Lectures to Medical Students / Doctors - [5]

1
2
3
4
5

Attending specialised Training away from work place

1
2

Writing Reports [2]: 1.

2

- Write an account of it.

Reflective practice [16]

04 significant clinical events which you think are important for you to reflect and 10 clinical scenarios out of 16 specified above

Journal clubs [5]

1
2
3
4
5

Demonstrations [4]

1
2
3
4

CME Article discussion [2]

1
2

Clinico- Pathology meetings [1]

Workshops - attendance [4]

1

2

3

4

5.3. REFLECTIVE PRACTICE

Learning to reflect on and learn from difficult clinical situations in which you have been directly involved, is a vital part of continuous professional development in being a good doctor. This is an integral part of clinical risk management which requires the recognition and analysis of significant clinical situations so that appropriate changes in management could be adopted to reduce the risks arising from such situations in the future. Reflective practice enables you to describe what happened and why, justify or identify any possible lapses in your management, what you have learnt from this experience and, most importantly, what you would do differently next time, considering current best available evidence.

Use the reflective practice format to document and analyse 10 out of the 16 clinical scenarios specified in the section Specific Tasks. In addition to this, when ever you are involved in a difficult clinical situation, record the event and your thoughts about it in the reflective practice format. Discuss as soon as possible with your Trainer at least four such clinical events that you think you should reflect on, especially cases that has been particularly distressing for you. You may need to examine previously held beliefs about your practice and accept that you may have been wrong and therefore need to change your practice. This process will help you to recognize and learn from prior experiences and improve your clinical practice. It is your responsibility to gather and record the material required for this process. The material you record will demonstrate your ability to maintain good continuous professional development by using every learning opportunity to be a reflective self-directed learner. Each clinical event you reflect on will be evaluated by your Trainer.

.

5.3.1 REFLECTIVE PRACTICE DOCUMENTATION –(Guideline to trainee)

Describe the management of the selected case:

What clinical problems did you see and observe?

What did you do?

Justification for what you did:

What did you learn from this experience?

What is done differently in other clinical units: local and foreign?

What would you do differently next time?

Evidence for suggesting these changes:

Has this experience highlighted any deficiencies in your training?

What learning needs did you identify from above?

Have you addressed these learning needs? If so How?

Has the experience made you feel good and why?

Summary of discussion with Trainer:

……
……

Comments of the trainer:

……
……

Comments of the trainee:

……
……

Assessment: mark/grade

Signature of Trainer:…….

Signature of Trainee:…… Date:……

Comments of the External Assessors:

ASSESSMENT OF REFLECTIVE PRACTICE

1. **Documentation Skills :**
   Clarity, Brevity, Correct sequence, Focused presentation

	Marks
Bad Failure	**7**
Borderline failure	**8**
Pass	**9**
Good pass	**10**
Excellent pass	**11**

2. **Reflective Ability**

		Marks
Bad Failure	**Has not completed Reflective cycle**	**7**
Borderline Failure	**Has only described the learning experience**	**8**
Pass	**Identified learning experience, analysed the ~~reasons for~~ the experience & the reasons for outcome**	**9**
Good Pass	**Evaluated how the outcome could have been different if a different course of action was taken.** **If the trainee has identified the learning experience, has adequate/over and above required competency or recognised he/she does not have adequate competency and takes appropriate steps to achieve the competency.This should be a good pass.** **I don't see how what you have described can be a good pass.Pl discuss and think about it.**	**10**
Excellent Pass	**Provided high quality evidence for implementing changes** **The trainers will need to know what high quality evidence is.** **I would place creative aspects like devising new ways of doing things, embarking on personal research, going the extra mile for patients and colleagues(this would come under attitudes in clinical practice),researching topics and using these for changing practice and proving whatever done works etc**	**11**

Signature of Trainer: ……...
Date……../……./……..

FINANCIAL, ETHICAL, LEGAL AND SOCIAL ISSUES

The trainee should demonstrate and awareness of financial, ethical, legal and social issues that are associated with clinical practice

Annex 14

Guideline for research proposal

Format of Detailed Project Proposal - MD Ophthalmology

Section 1

1. Name of trainee
2. Name(s) of supervisor(s)
3. Training centre

Section 2

1. Project title
2. Introduction
   a. Background and justification
   b. Literature Review
3. Objectives of study
4. Research plan
   a. Design
   b. Setting
   c. Method
   d. Sample size and sampling techniques
   e. Outcome measures
   f. Statistical analyses and plan of presentation of results
   g. Ethical considerations
   h. Work plan and time lines
5. References
6. Funding for study
7. Signature of trainee

Section 3

Recommendation of supervisor(s)

Signature of Supervisor 1 Signature of Supervisor 2

Date Date

Section 4

Date of submission to PGIM

Date of approval by BOS Signature of Secretary BOS

MD Ophthalmology
Assessment of the Project Proposal by Reviewers

Name of Trainee :
Training Centre :
Supervisor :
Name of Reviewer **:**
Designation : Official Address:
Tel/Fax :
Email :

Title of Project:
.....
.....

The two reviewers appointed by the BoS shall use the following guideline and marking scheme to assess the project proposal of the candidate

1. Title and Introduction: Rationale (Justification)–problem identified and quantified. Hypothesis and expected outcome, impact and relevance of the study.

Comments:
.....
.....

Marks (10):

2. Literature Review: Adequacy (evidence of a systematic search for related. similar, relevant studies)

Comments:
.....
.....

Marks (10):

3. Objectives: Clearly defined. Relevant and stated in measurable terms.

Comments:
.....
.....

Marks (10):

4. Method: Appropriate study design to address the objectives with clear detailed description of subjects, sampling technique and sample size, interventions, data collection and management. The study should be, internally valid and reproducible. Where specific details are available in the literature, reference should be made to the original papers, and comments kept to a minimum. If modifications have been made to the published techniques, these should be described in full. Appropriate statistical tests planned should be mentioned and ethical issues addressed

Comments:
.....
.....

Marks (30):

5. Ethical considerations/institution from where ethical approval will be /has been obtained:
Comments:
.....
.....
Marks (10):
6. References: According to the Vancouver system and relevant to the study. Properly documented in the Bibliography and appropriately cited in the text.

Comments:
.....
.....
Marks (10):

Recommendation of reviewer:

- Is the project proposal acceptable? Yes/No
- If No, What corrections are required? (Attach a separate sheet of paper if necessary)

.....
.....
- Additional Comments: .....

Total Marks (80)

Signature: ..... Date:

Recommendation of the BOS: .....
Signature of Chairperson/Secretary: .....
Date:

Annex 15

Portfolio VIVA and PBCA

PRE-BOARD CERTIFICATION ASSESSMENT

In 2009, the PGIM decided that prior to Board Certification as a Specialist, all trainees should go through a Pre-Board Certification Assessment (PBCA), which would be equivalent to the Specialty Certification Examinations in UK and other countries. This requirement was implemented in 2011 through PGIM Director's Memo No: AC/03/2011 dated 16.06.2011
After consideration of many prospectuses for speciality and sub-speciality training, which have been submitted for PGIM approval in the last few years, the AAAEDC recommends that the PGIM considers revision of the format of PBCA, based on adoption of the following broad outcomes for specialist training, across all specialities and sub-specialities:

1. Subject expertise
2. Teaching
3. Research and audit
4. Ethics and medico-legal issues
5. Information technology
6. Life-long learning

Assessment tool
The PBCA should be based on assessment of a portfolio maintained by the trainee during the period of post-MD training. The contents of the portfolio should encompass all of the above learning outcomes and contain evidence of achievement of these outcomes by the trainee. Although some of these may have been evaluated before the MD examination, the portfolio assessed at the PBCA should mainly contain evidence of achievements during post-MD training, either locally or overseas. All sections need not be of equal weight – for example, the section on Subject Expertise may be much more detailed than the others.

Contents of portfolio

The contents of the portfolio should be divided into sections according to the outcomes stated above, followed by a final section that contains evidence of reflective practice.

The following list sets out the type of evidence that may be relevant to each section. The details should be determined by each Board.

1. Subject expertise:
    - progress reports from supervisors (essential, should be according to prescribed format)
    - Supervisor feedback on communication skills
    - log of procedures carried out
    - results of any work-place assessments conducted
    - In the case of sub-specialities, this section must include evidence that the trainee has acquired the essential knowledge, skills and competencies related to the sub-speciality, identified by the Speciality Board, and monitored with regular assessments throughout the period of post-MD training, e.g. mini-CEX, Case-Based Discussions, Direct Observation of Practical Skills
2. Teaching
    - undergraduates

- postgraduates
- ancillary health staff

3. Research and Audit relevant to speciality or subspeciality
    - Dissertations / theses
    - Research papers published or accepted for publication
    - abstracts of presentations
    - Clinical audit
4. Ethics and Medico-legal Issues
    - Completed Professionalism Observation Forms (from integrated learning component of Professionalism Strand)
    - Completed PTR forms during post-MD training
5. Information Technology
    - Participation in training programmes / workshops
    - Evidence of searching for information and application of findings in practice
6. Life-long learning
    - Participation in conferences and meetings
7. Reflective practice
    - narration of at least one learning event experienced by the trainee, in relation to each of the above outcomes, with reflection on what and how the trainee learned from this experience

The precise details of what is expected by the Board should be made known to trainees at commencement of post-MD training.

Portfolio assessment

The portfolio should be reviewed at least every 6 months by the local supervisor(s), with regular feedback to the trainee on how the portfolio may be improved. When the trainee is eligible for PBCA, 3 copies of the completed portfolio should be submitted to the PGIM Examinations Branch.

The PBCA should take the form of a final, summative assessment of the trainee's portfolio, carried out by 2 (or 3) independent examiners appointed by the relevant Board of Study or Speciality Board and approved by the Senate of the University of Colombo. The 3rd examiner should be from outside the discipline to improve objectivity.

The trainee should be called for an oral examination, during which he/she will be questioned on the portfolio. The trainee may be required to start with a presentation of 10 – 15 minutes, on the post-MD training if the Board deems it appropriate.

The overall assessment should be based on each of the main sections, which should be assessed as satisfactory or not on an overall basis. It is left to the Boards to decide whether to use a rating scale.

If the examiners are of the view that the trainee's performance is unsatisfactory, and the trainee should not be given immediate Board Certification, the examiners must provide the trainee with written feedback on how the portfolio should be improved in order to reach the required standard. The trainee should then re-submit the portfolio within a specified period of time (up to 3 – 6 months), and face another oral examination based on the re-submitted portfolio. If the trainee is successful at this 2nd oral examination, the date of Board Certification should be backdated as done routinely. If unsuccessful again, the date of Board Certification will be the date of passing the subsequent PBCA following further training for a minimum period of six months in a unit selected by the Board of Study.

Annex 16

Reference list for selection exam:-

Anatomy and Embryology

1. Last Anatomy
2. Clinical Anataomy – Harold Lllis
3. Grant's Atlas of Anotomy
4. Clinical Nero Anatomy – Richard S Snell
5. Langmans Medical Embryology

Physiology

1. Ganong's review of medical physiology
2. Text book of medical physiology – Guyten & Hall

Pathology

1. Robbin's basic pathology - Kumar Abbas
2. Robbin's Pathological Basis of Disease - Kumar Abbas
3. Concise Pathology

Pharmacology

1. Pharmacology – H P Rang , M. M. Dale
2. British National Formulary
3. Clinical Pharmacology – Lorrence & Bennet

Micro Biology and Parasitology

1. Medical Micro Biology – David Greenwood
2. Note on Medical Micro Biology – Timbury

Reference list for Ophthalmic Basis Sciences Examination

Orbital and Ocular Anatomy

1. Wolff's Anatomy of the Eye & Orbit
2. Clinical Anatomy of the Eye – Richard N. Snell
3. American Academy of Ophthalmology – Fundamentals and principles of Ophthalmology

Ocular Physiology

1. Adlers Physiology of the Eye 11th Edition
2. Physiology of the eye – Davson
3. American Academy of Ophthalmology – Fundamentals and principles of Ophthalmology

Basics in Ocular Pathology

1. The Eye Basis science in practice – John V Foresster (Relevant chapters)
2. Clinical Ophthalmology a systematic approach – Jack Kanski (Relevant chapters)

REFERENCES – OPTICS AND REFRACTION

A R Elkington,H J Frank Clinical Optics
Albert DM, Miller JW, Azar DT, Blodi BA, eds. *Albert and Jakobiec's Principles and Practice of Ophthalmology*. 3rd ed. Philadelphia: saunders; 2008.
Campbell CJ. *Physiological Optics*. Hagerstown, MD: Harper & Row; 1974
Corboy JM, *the Retinoscopy Book: an Introductory Manual for Eye Care Professionals*. 5th ed. Thorofare, NJ: Slack; 2003.
Duke- Elder S, Abrams D. *System of Ophthalmology. Volume V, Ophthalmic Optics and Refraction*. St Louis: Mosby; 1970.
Michaels DD, *Visual Optics and Refraction: A Clinical Approach*, 3rd ed. St Louis: Mosby' 1985.
Milder B, Rubin ML. *The Fine Art of Prescribing Glasses Without Making a Spectacle of Yourself*. 3rd ed. Gainesville, FL: Triad; 2004.
Rubin ML. *Optics for Clinicians*. Gainesville, FL: Triad; 1993.
Stein Ha, Slatt BJ, Stein RM. *Fitting Guide for Rigid and Soft Contact Lenses: A practical Approach*. 4th ed. St Louis: Mosby; 2002
Tasman W, Jaeger EA, eds. *Duane's Clinical Ophthalmology*. Philadelphia: Lippincott- Raven; 1995.
Yanoff M, Duker J. *Ophthalmology*. 2nd ed. St Louis: Mosby; 2004.

Reference list for MD Ophthalmology examination

1. Duen's Clinical Ophthalmology
2. American Academy of Ophthalmology - Basis and clinical science course 12 volumes
3. Binocular Vision and Ocular Motility – Trimble
4. Atlas of Strabismus – Von Noorden
5. Clinical Ophthalmology – Jack J Kanski
6. World Glaucoma Association - Consensus Series
7. Diseases of Orbit – Rootman
8. Ophthalmic Pathology – Spencer
9. Pediatric Ophthalmology – Taylor
10. Neuro Ophthalmology Review Manual – Bagandas
11. Ophthalmic Lasers – Lesperance
12. Modern Ophthalmology 3 volumes
13. Journals – (Major reviews and updates)
    a) Survey of ophthalmology
    b) Eye
    c) Archives
    d) American journal of Ophthalmology
    e) British journal of Ophthalmology
    f) Ophthalmology
14. Stallard Eye Surgery