Sri Lakshmi Narayana Institute of Medical Sciences

Annexure 1

Date 18/12/2020

From
Prof.D.Baba, MS
Professor and Head,
Ophthalmology,
Sri Lakshmi Narayana Institute Of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

To
The Dean,
Sri Lakshmi Narayana Institute Of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Permission to conduct value-added course: APPLANATION TONOMETRY

Dear Sir,

With reference to the subject mentioned above, the department proposes to conduct a value-added course titled: **APPLANATION TONOMETRY** on **JAN 2021 TO APR 2021**. We solicit your kind permission for the same.

Kind Regards

PROF.D.BABA, MS
HOD, OPHTHALMOLOGY

FOR THE USE OF DEANS OFFICE

Names of Committee members for evaluating the course:
The Dean:
The HOD:
The Expert:
The committee has discussed about the course and is approved.

Subject Expert HOD

DEAN
Prof.K.BALAGURUNATHAN,M.S
(General surgeon)
SRI LAKSHMI NARAYANA
INSTITUTE OF MEDICAL SCIENCES
OSUDU, PONDICHERRY

PROFESSOR & HOD
DEPARTMENT OF OPHTHALMOLOGY,
SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES
PUDUCHERRY-605 502.

OFFICE OF THE DEAN

Sri Lakshmi Narayana Institute of Medical Sciences

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,
PUDUCHERRY - 605 502.
[Recognised by Medical Council of India, Ministry of Health letter No. U/12012/249/2005-ME (P -II) dt. 11/07/2011]
[Affliated to Bharath University, Chennai - TN]

Ref. No. SLIMS/Dean Off/VAC / OPH04 **Date: 18.12.2020**

From
The Dean
Sri Lakshmi Narayana Institute of Medical sciences,
Pondicherry – 605502

To
The Registrar,
Bharath Institute of Higher Education and Research,
Chennai - 600073.

Respected Sir

Sub: Request for permission and approval of Syllabus for certificate course (Value Added course) for the academic year 2020-2021 - Reg
Ref: Requesting letter received from Departments

*****

With reference to the above, herewith forwarding the proposed list of Value-added courses for necessary permission and approval of syllabus to conduct the same.

1. APPLANATION TONOMETER
2. DRY EYE
3. CHEMICAL INJURIES

This is for your kind information and needful action.

Thanking you

Yours faithfully

[DEAN]

DEAN
Prof.K.BALAGURUNATHAN,M.S
(General surgeon)
SRI LAKSHMI NARAYANA
INSTITUTE OF MEDICAL SCIENCES
OSUDU PONDICHERRY

Encl's:

1. Requesting letter received from department
2. Syllabus of the course
3. Details of faculty handling course

Sri Lakshmi Narayana Institute of Medical Sciences, Puducherry

VALUE ADDED COURSE –

1. APPLANATION TONOMETER
2. DRY EYE
3. CHEMICAL INJURIES

COURSE CO-ORDINATOR DETAILS

Faculty Name: Prof.D.Baba, MS

Email ID: ophthalmologyprof@gmail.com

Mobile number: 8585485988

Bharath
INSTITUTE OF HIGHER EDUCATION AND RESEARCH
(Declared as Deemed - to - be - University under section 3 of UGC Act 1956)

Ref. No. BHIER/ VAC / OPH04 **Date: 21.12.2020**

From

The Registrar,
Bharath Institute of Higher Education and Research,
Chennai - 600073.

To

The Dean
Sri Lakshmi Narayana Institute of Medical sciences,
Pondicherry – 605502

Sir / Madam,

Sub: Approval of Syllabus to conduct certificate course (Value Added course) for the academic year 2020-2021 – Reg.

Ref: Ref. No. SLIMS/Dean Off/VAC /OPH04 Dated: 18.12.2020

*****

With reference to the above, it is to inform that the proposal submitted to conduct Value Added Course has been accepted and approved by BIHER, council meeting. List of the VAC are mentioned below for the academic year 2020– 2021. The abstract of the VAC course completion detail should be submitted to the Registrar office.

1. APPLANATION TONOMETER
2. DRY EYE
3. CHEMICAL INJURIES

Thanking you

Yours faithfull

REGISTRAR

OFFICE OF THE DEAN

Sri Lakshmi Narayana Institute of Medical Sciences

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,
PUDUCHERRY - 605 502.
[Recognised by Medical Council of India, Ministry of Health letter No. U/12012/249/2005-ME (P -II) dt. 11/07/2011]
[Affliated to Bharath University, Chennai - TN]

Circular

22.02.2021

Sub: Organising Value-added Course: APPLANATION TONOMETRY

With reference to the above mentioned subject, it is to bring to your notice that Sri Lakshmi Narayana Institute of Medical Sciences, **Bharath Institute of Higher Education and Research** is organizing **"APPLANATION TONOMETRY"**. The course content and registration form is enclosed below."

The application must reach the institution along with all the necessary documents as mentioned. The hard copy of the application should be sent to the institution by registered/ speed post only so as to reach on or before 10TH JAN 2021. Applications received after the mentioned date shall not be entertained under any circumstances.

Dean

DEAN
Prof.K.BALAGURUNATHAN,M.S
(General surgeon)
SRI LAKSHMI NARAYANA
INSTITUTE OF MEDICAL SCIENCES
OSUDU, PONDICHERRY

Encl: Copy of Course content

VALUE ADDED COURSE

1. Name of the programme & Code

Applanation Tonometry

2. Duration & Period

30 hrs & Jan-2020 – Apr-2021

3. Information Brochure and Course Content of Value Added Courses

Enclosed as Annexure- I

4. List of students enrolled

Enclosed as Annexure- II

5. Assessment procedures:

Multiple choice questions- *Enclosed as Annexure- III*

6. Certificate model

Enclosed as Annexure- IV

7. No. of times offered during the same year:

Jan-2020 – Apr-2021 (1)

8. Summary report of each program year-wise

Value Added Course- Jan-2021 – Apr-2021					
Sl. No	**Course Code**	**Course Name**	**Resource Persons**	**Target Students**	**Strength & Year**
1	**OPH04**	Applanation tonometry	Prof.K.Rathnakumar, M.S, D.O,	30	2021

9. Course Feed Back

Enclosed as Annexure- V

Prof. K. Rathnakumar, M.S, D.O,
(Prof-Ophthalmology)
RESOURCE PERSON

Prof. D. Baba, M.S,
(Prof & HOD-Ophthal)
COORDINATOR

PROFESSOR & HOD
DEPARTMENT OF OPHTHALMOLOGY,
SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES
PUDUCHERRY-605 502.

Annexure 2 – Course Proposal

Course Title: APPLANATION TONOMETRY

Course Objective:

1. Intraocular Pressure
2. Types of tonometry
3. Principle of applanation tonometer
4. Uses of applanation tonometer
5. Correlation between CCT and AT
6. Fluorescein dye
7. Maintenance of applanation tonometer
8. Glaucoma correlation with AT

Course Outcome: On successful completion of the course the students will be able to understand the uses of AT and methods to handle the same, along with its maintenance.

Course Audience: MBBS UNDERGRADUATES

Course Coordinator: PROF.D.BABA, MS,

Course Faculties with Qualification and Designation:

1. **Prof.D.Baba, MS, - HOD Ophthalmology**
2. **Prof.K.Rathnakumar, MS,DO, - Professor Ophthalmology**

Course Curriculum/Topics with schedule (Min of 30 hours)

SlNo	Date	Topic	Time	Hours
1.	18/7/2020	1.Intraocular Pressure	4-6PM	2
2.	20/7/2020	2.Types of tonometry	4-7PM	3
3.	22/7/2020	2.Types of tonometry	4-6PM	3
4.	25/7/2020	3.Principle of applanation tonometer	4-6PM	2
5.	29/7/2020	3.Principle of applanation tonometer	4-7PM	3
6.	10/8/2020	4.Uses of applanation tonometer	4-7PM	3
7.	13/8/2020	4.Uses of applanation tonometer	4-7PM	3
8.	15/8/2020	5.Correlation between CCT and AT	4-6PM	2
9.	17/8/2020	5.Correlation between CCT and AT	4-6PM	2
10.	20/8/2020	6.Fluorescein dye	4-7PM	3
11.	21/8/2020	7. Maintenance of applanation tonometer	4-6PM	2
12.	25/8/2020	8. Glaucoma correlation with AT	4-6PM	2
			TOTAL HOURS	30

REFERENCE BOOKS: (Minimum 2)

1. JACK J KANSKI clinical ophthalmology a systemic approach-6th edition.
2. PARSON'S Diseases of the eye – 19th edition

APPLANATION TONOMETRY

Intraocular pressure (IOP) is determined by the balance between the rate of aqueous production and its outflow. The average IOP in the general population is around 16 mmHg on applanation tonometry, and a range of about 11–21 mmHg.

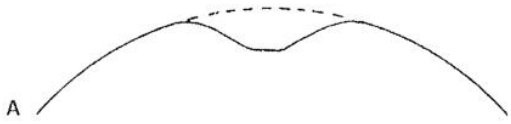
All clinical tonometers measure the IOP by relating a deformation of the globe to the force responsible for the deformation .

The two basic types of tonometers differ according to the shape of the deformation: indentation and applanation (flattening).

- **Tonometry**
  - **Applanation**
    - Variable force
      - Goldmann
    - Variable area
      - Maklakoff
  - **Indendation**
    - Schiotz

Indendation tonometers

- The shape of the deformation with this type of tonometer is a truncated cone .
- The precise shape, however, is variable and unpredictable.
- In addition, these instruments displace a relatively large intraocular volume.
- As a result of these characteristics, conversion tables based on empirical data from in vitro and in vivo studies must be used to estimate the IOP.



Why applanation tonometry???

Indendation tonometry is:

- Significantly influenced by ocular rigidity
- Moses effect-at lower scale readings the cornea moulds into the space between the hole and plunger-pushes the plunger up-falsely high IOP values

Applanation tonometers

- The shape of the deformation with these tonometers is a simple flattening
- Because the shape is constant, its relationship to the IOP can, in most cases, be derived from mathematical calculations.
- The applanation tonometers are further differentiated on the basis of the variable that is measured.

Variable force applanation tonometers

- This type of tonometer measures the force that is required to applanate (flatten) a standard area of the corneal surface.
- The prototype is the Goldmann applanation tonometer, which was introduced in 1954.

Others are:

1. Perkin's
2. Draeger
3. Mackay Marg
4. Pneumotonometer
5. PASCAL-DCT

Variable area tonometers

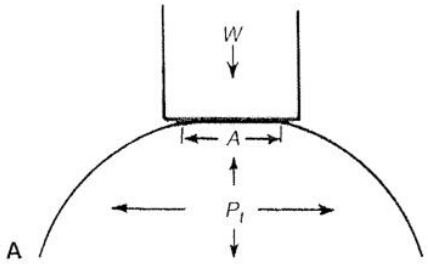
- Variable Area tonometers measure the area of the cornea that is flattened by a known force (weight)
- The prototype in this group is the Maklakoff tonometer, which was introduced in 1885.

Others are:

1. Applanometer
2. Tonomat
3. Halberg tonometer
4. Barraquer tonometer
5. Ocular tension indicator
6. Glaucotest

Principle of Goldmann applanation tonometry

- Goldmann based his concept of tonometry on a modification of the Maklakoff-Fick law, also referred to as the Imbert-Fick law
- This law states that an external force (W) against a sphere equals the pressure in the sphere (P) multiplied by the area flattened (applanated) by the external force (A)
- W=P x A



But???

The validity of the law requires that the sphere be

1. Perfectly spherical
2. Dry
3. Perfectly flexible

4. Infinitely thin

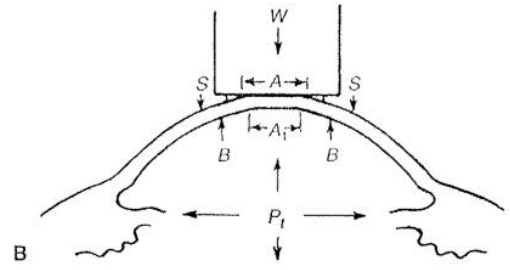
The cornea fails to satisfy any of these requirements, in that it is :

1. Aspherical
2. Wet
3. Neither perfectly flexible
4. Nor infinitely thin
5. The moisture creates a surface tension (S)
6. Lack of flexibility requires a force to bend the cornea (B), which is independent of the internal pressure.
7. In addition, because the cornea has a central thickness of approximately 550 µm, the outer area of flattening (A) is not the same as the inner area (A1)
8. It was therefore necessary to modify the Imbert Fick law to account for these characteristics of the cornea:
9. **W+S =(P x A1)+ B**
10. When A1 equals 7.35 sq.mm S balances B and W equals P

This internal area of applanation is obtained when the diameter of the external area of corneal applanation is **3.06 mm**, which is used in the standard instrument.

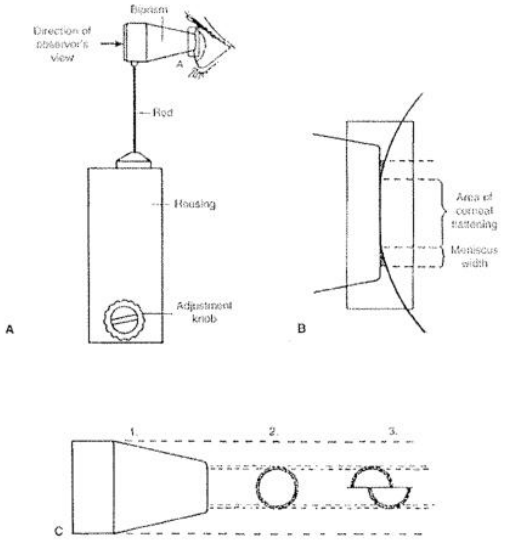
The volume of displacement produced by applanating an area with a diameter of 3.06 mm approximately **0.50 cu mm**.

11. Ocular rigidity does not significantly influence the measurement.

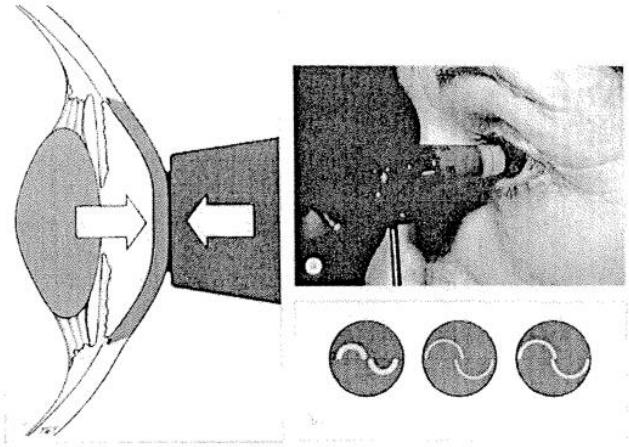


Description of Tonometer:

- The instrument is mounted on a standard slitlamp in such a way that the examiner's view is directed through the center of a plastic biprism, which is used to applanate the cornea.
- Two beam splitting prisms within the applanating unit optically convert the circular area of corneal contact into semi circles



- The cornea is anesthetized with a topical preparation, and
- the tear film is stained with sodium fluorescein(touching a fluorescein impregnated paper strip to the tears in the lower cul-de-sac)
- .the cornea and biprism illuminated by a cobalt blue light from the slitlamp,
- the biprism is brought into gentle contact with the apex of the cornea .
- The fluorescence of the stained tears facilitates visualization of the tear meniscus at the margin of contact between cornea and biprism.
- The fluorescent semicircles are viewed through the biprism, and
- the force against the cornea is adjusted until the inner edges overlap.
- The influence of the ocular pulsations is seen when the instrument is properly positioned,
- The IOP is then read directly from a scale on the tonometer housing.



Sources of error in IOP reading

1. Incorrect fluorescein pattern

- Over staining-Thick mires-Falsely high IOP
- Under staining-Thin mires-Falsely low IOP

2. Pressure on the globe

- By examimer
- Squeezing of eyelids by patient
- Thyroid myopathy

3. Corneal thickness

- Thick corneas-Flasely high IOP
- Thin corneas-Falsely low IOP-esp following refractive surgeries

4. Corneal edema-Artificially low IOP
5. Corneal astigmatism:

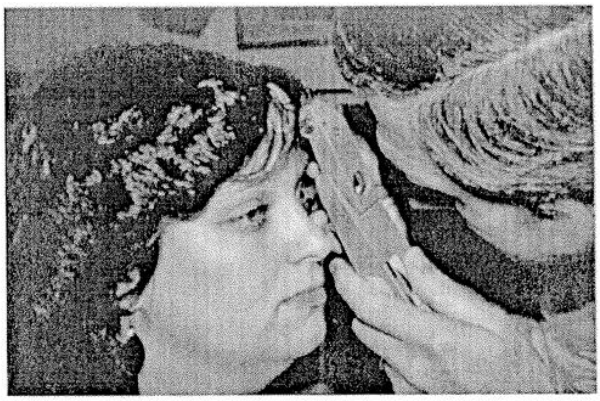
- Can distort the mires
- If more than 3 D the rism can be rotated over 90 deg and the average of the two readings can be taken.
- Incorrect calibration of the tonometer
- Other factors-tight collar-obstructs venous return
- Wide pulse pressure-smal loscillation can occur in the IOP with time due to variability in ocular perfusion; the mid point can be taken as the reading
- Repeated readings over a short period-lowers IOP due to massaging effect

Reducing the risk of cross infection

- Avoid in individuals with overt infection
- Using a disposable sleeve to cover the tonometer tip
- Swabbing the tip with an **alcohol prep pad** and allowing it to dry for 10 minutes-kills **HIV** and most organisms except HBV ,HBC and acanthamoeba
- Wiping then soaking the tonometer in **3% hydrogen peroxide** for 5 minutes-removes **HBC**
- As this is extremely toxic to the corneal epithelium the tip must be thoroughly wiped before use.

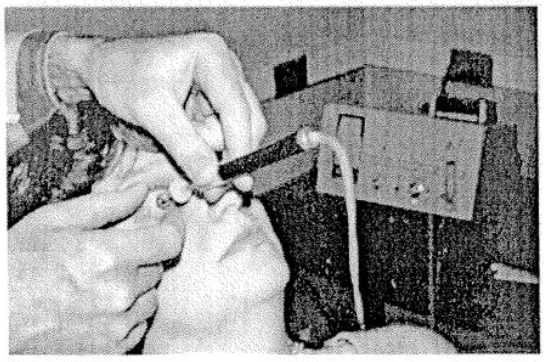
Perkin's tonometer

- Hand held Goldmann's tonometer
- Can be used in bed bound/anaesthetized patients



Pneumotonometer

- Based on applanation principle
- Uses a puff of air to flatten the cornea
- Time required to flatten the cornea co relates with the IOP
- Non contact-no risk of cross infection
- Can be used for screening
- But it is accurate only within the low to middle range values of IOP not for very high IOP.

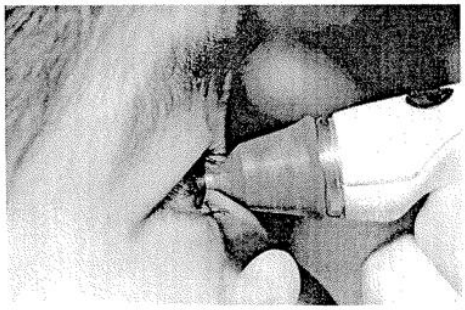


Mackay marg tonometer

- The original Mackay-Marg tonometer, which is no longer available, had a plate diameter of 1.5 mm surrounded by a rubber sleeve.
- The force required to keep the plate flush with the sleeve was electronically monitored and recorded on a paper strip .

Tonopen

- The most commonly used Mackay Marg type of tonometer is the tonopen.
- An electrical signal is created as the footplate flattens the cornea.
- This is picked up by a microprocessor which measures the force required to flatten the cornea.
- Averages 4 to 10 readings to give a final digital readout.
- **CAN BE USED IN SCARRED/EDEMATOUS CORNEAS/OVER BANDAGE CONTACT LENSES**

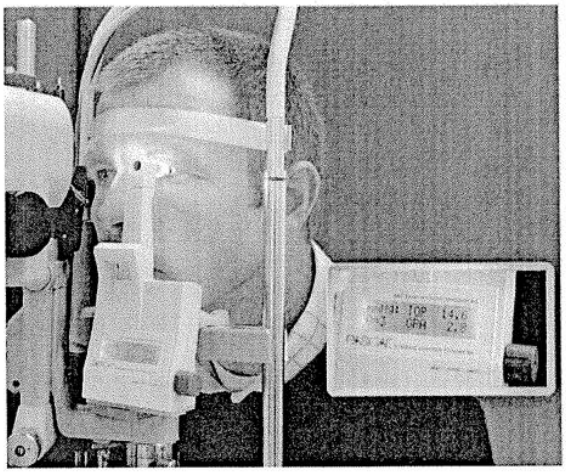


NCT

- After proper alignment of the patient, a puff of room air creates a constant force that momentarily deforms the central cornea,
- Detected by an optoelectronic system of a transmitter.
- This directs a collimated beam of light at the corneal vertex,
- A receiver and detector, which accepts only parallel, coaxial rays reflected from the cornea.
- At the moment that the central cornea is flattened, the greatest number of reflected light rays are received, which is recorded as the peak intensity of light detected.
- The time from an internal reference point to the moment of maximum light detection is converted to IOP.

DCT

- Measures IOP relatively independent of CCT
- It is used along with slit lamp similar to Goldmann's



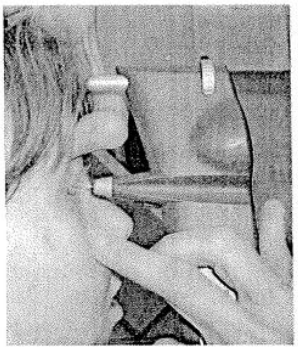
Other newer tonometers

Reichert ocular response analyser:

- Type of pneumotonometer
- Compensates for corneal hysteresis

I care:

- Hand held
- Rebound tonometry
- Only momentary contact-No anaesthetic needed ,useful for self monitoring



Comparision between tonometers with respect to Goldmann

- The Schiötz tonometer reads lower than the Goldmann.

- The Perkins applanation tonometer compared favorably against the Goldmann tonometer
- Tono-Pen underestimates Goldmann IOP in the higher range and overestimates in the lower range
- In comparing IOPs in eyes before and after LASIK for myopia, pneumotonometry showed less IOP lowering compared with Goldmann applanation tonometry after LASIK-induced cornea thinning.

Annexure- II

VALUE ADDED COURSE

Applanation Tonometry

4. List of Students Enrolled Jan-2021 – Apr-2021

Sl. No.	Univ. Reg. No.	Name of the Student	Signature
1	U16MB251	AARTHI.A	Aarthi - A.
2	U16MB252	ABILASHA.K	Abhilasha. K.
3	U16MB253	ABITHA RAJLIN J.S	Abitha Rajlin J.S.
4	U16MB254	ADAPALA PRIYANKA	Adapala priyanka
5	U16MB255	ADHITHAYA RAJ .N	Adhithaya. Raj.
6	U16MB256	AJAY .N	Ajay. N.
7	U16MB257	AKSHYA .R	Akshaya. R.
8	U16MB258	ALLARI KARTHIK ABHIROOP	Allari karthik abhiroop.
9	U16MB259	AMAL ASHOK	Amal ashok
10	U16MB260	AMIRTHAVARSHNI .R	amirthavarshini
11	U16MB261	ANANYA SHARMA	Ananya sharma
12	U16MB262	ANGALAKUDURU DEEPCHAND	Angalakuduru deepchand
13	U16MB263	ANJAN BANERJEE	Anjan banerjee
14	U16MB264	ANWESHA CHATTERJEE	Anwesha chatterjee.
15	U16MB265	ARCHANA .A	Archana.
16	U16MB266	ARCHITHA.A	Architha. A.
17	U16MB267	ARIVUMATHI .R	Arivumathi. R.
18	U16MB268	ARJUN.S	Arjun. S.
19	U16MB269	ASHVANTH KUMAR .A	Ashvanth kumar.
20	U16MB270	ASMITHA S.V	Asmitha. S.V.
21	U16MB271	AVIDI VENKATA SAISUSHMA	Avidi venkata saisushma.

22	U16MB272	AVIRAL PATPATIA	Aviral Patpatia.
23	U16MB273	BALACHANDRAN .A	Balachandra
24	U16MB274	BALAJI .S	Balaji. S
25	U16MB275	BHASKARAN .K.C	Bhaskaran. K.C
26	U16MB276	BHAVANI . K.M	Bhavani. K.M
27	U16MB277	BLESSY AMALA RISHA .J	Blessy amala risha. J
28	U16MB278	CAREENA DANIEL	Careena daniel.
29	U16MB279	CHANDRA PRAKASH.M	Chandra prakash. M
30	U16MB280	CHINJU S.R	Chinju. S.R

Prof.K.Rathnakumar, MS,DO

RESOURCE PERSON

Prof.D.Baba, MS, -HOD

COORDINATOR

PROFESSOR & HOD
DEPARTMENT OF OPHTHALMOLOGY,
SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES
PUDUCHERRY-605 502.

Aadhi A
U16 MB 251

SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

Annexure - IV

APPLANATION TONOMETRY

MULTIPLE CHOICE QUESTIONS

Course Code: OPH04

I. ANSWER ALL THE QUESTIONS

1. Normal IOP's
   a) 5-6 mmHg
   b) 11-21 mmHg
   c) 20-30 mmHg
   d) 30-40 mmHg
2. Tonometer head has
   a) Convex lens
   b) Concave lens
   c) Biprism
   d) None of above
3. Gold standard IOP Measurement is by
   a) Schiot
   b) NCT
   c) Goldman application
   d) Digital method
4. Source of error in IOP reading includes
   a) Thick corneas
   b) Over staining
   c) Corneal edema
   d) All of above

5. Tonometer head is sterilised using
   a) Alcohol swab
   b) Distilled water
   c) Beta dine solution
   d) Tap water
6. Hand held goldman tonometer is
   a) Perkins
   b) NCT
   c) Pneumotonometer
   d) Mackaymarg tonometer
7. Dye used during applanation tonometry is
   a) Trypan blue
   b) Flowercein strip
   c) Indoyanive green
   d) Yellow
8. Applanation Tonometry is base on
   a) Imbert – Fick law
   b) Snell's law
   c) Robert – Fick law
9. Tonometry means measwement of
   a) Intraocular pressure
   b) Corneal curvature
   c) Axial lengh of eyeball
   d) IOL power

10. Applanation Tonometry includes all except

a) Goldman's tonometer

b) Perkin's tonometer

c) Schiotz tonometer

d) Draeger tonometer

Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research
(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that AARTHI.A (U16MB251) has actively participated in the Value Added Course on APPLANATION TONOMETRY held during JAN 2021 TO OCT 2021 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

Prof.K.Rathnakumar, MS, DO,
RESOURCE PERSON

Prof.D.Baba, MS,
COORDINATOR

Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research
(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that ABILASHA.K (U16MB252) has actively participated in the Value Added Course on APPLANATION TONOMETRY held during JAN 2021 TO APR 2021 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

Prof.K.Rathnakumar, MS, DO,
RESOURCE PERSON

Prof.D.Baba, MS,
COORDINATOR

Student Feedback Form

Course Name: **APPLANATION TONOMETRY**

Subject Code: **OPH04**

Name of Student: _____ Roll No.: _____

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Sl. NO	Particulars	1	2	3	4	5
1	Objective of the course is clear				✓	
2	Course contents met with your expectations				✓	
3	Lecturer sequence was well planned				✓	
4	Lectures were clear and easy to understand				✓	
5	Teaching aids were effective				✓	
6	Instructors encourage interaction and were helpful				✓	
7	The level of the course				✓	
8	Overall rating of the course	1	2	3	4	5

** Rating: 5 – Outstanding; 4 - Excellent; 3 – Good; 2– Satisfactory; 1 - Not-Satisfactory*

Suggestions if any:

Aarthi. A

Signature

Date: