



Tanta University
Faculty of Medicine
Ophthalmology Department

29/8/2021

Master exam; Optics
(All questions must be answered)
Time allowed: 3 hours

❖ Discuss the following

1. Critical angle and its clinical applications
2. Lens decentration and its clinical importance
3. Galilean telescope and its applications

❖ Identify the correct answer:

1. Which is not true about visible light:

- A. wavelengths represent about 1% of the electromagnetic spectrum.
- B. has shorter wavelengths than ultraviolet light.
- C. has shorter wavelengths than radiowaves.
- D. has wavelengths about 400 to 700 nm.

2. A +5.00D hyperope, with a PD (inter-pupillary distance) of 5 centimeters, is mistakenly given glasses which are decentered outward by 5mm OU. The total amount of dioptric convergence power required to observe an object at 1/3 meter is:

- A. 10Δ
- B. 20Δ
- C. 25Δ
- D. 30Δ

3. Which is true about anti-reflective coatings:

- A. The principle of destructive interference applies.
- B. They cause the lenses to grow dark in bright light.
- C. They absorb ultraviolet light.
- D. They can only be used on plastic lenses.

4. The incorrect character of photochromic lenses is that they:

- A. darken when they contact ultraviolet (UV) light.
- B. take longer to darken than lighten.
- C. are excellent UV absorbers when dark.
- D. absorb about 80% of incident light when maximally darkened.

5. In designing bifocals, "image jump" can best be minimized by:

- A. using a small bifocal segment
- B. lowering the bifocal segment by 3 mm
- C. using a bifocal type that has the segment's optical center near the segment top
- D. placing the top of the segment as close as possible to the optical center of the distance segment

6. A patient sees well with a prescription for glasses of -8.00 sph in both eyes and a vertex distance of 15 mm. If new glasses are made with a vertex distance of 20 mm, what is the adjustment in the power of the lenses required to correct the refractive error?

- A. 1.12 D
- B. -0.67 D
- C. 0.37 D
- D. -0.33 D

7. What technique allows objective measurement of astigmatism?

- A. Jackson cross cylinder test
- B. astigmatic dial test
- C. retinoscopy
- D. stenopeic slit test

8. Which is not true about the red-green duochrome test, it:

- A. is used for binocular balance.
- B. makes use of the eye's chromatic aberration.
- C. uses a pair of colored slides at 500 nm (green) and 670 nm (red).
- D. is sensitive to 0.25 diopter.

9. What is the reading distance for an adult patient, with a distance correction of -4.00 OU, who is reading with a pair of $+6.00$ D reading glasses?

- A. 10 cm
- B. 16.7 cm
- C. 25 cm
- D. 12.5 cm

10. Which is not true during retinoscopy:

- A. a typical working distance is 75 cm.
- B. the far point of the uncorrected hyperope is behind the patient's retina.
- C. the closer to neutrality, the faster the reflex movement.
- D. the closer to neutrality, the brighter the reflex movement.

11. Keratometry readings of a cornea are $44.00D @ 90^\circ$ and $42.00D @ 180^\circ$. The manifest refraction is $-6.00 + 4.00 \times 90^\circ$. What is the correction for lenticular astigmatism?

- A. $+4.00 \times 90^\circ$
- B. $+4.00 \times 180^\circ$
- C. $+2.00 \times 90^\circ$
- D. $+2.00 \times 180^\circ$

12. What is wrong about the lensometer:

- A. It measures the focal length of the lens.
- B. It consists of a movable target, a powerful fixed lens, and a telescopic eyepiece.
- C. It maintains proportion among the power of the unknown lens, the target, and the fixed-field lens.
- D. It can be used with progressive multifocal lenses.

13. What is the effect of common refractive errors on the apparent size of the optic disc as seen with a direct ophthalmoscope?

- A. The optic disc will appear smaller in a myopic eye than an emmetropic eye.
- B. The optic disc will appear larger in a hyperopic eye than an emmetropic eye.
- C. The optic disc will appear smaller in a myopic eye than a hyperopic eye.
- D. The optic disc will appear smaller in an aphakic eye than an emmetropic eye.

14. Which is not true about progressive addition lenses:

- A. they are characterized by a disadvantage is that laboratory-applied coatings cannot be used.
- B. they are available in glass and plastic.
- C. they disturb peripheral visual space.
- D. they require the patient to learn head-turning.

15. Where is the far point of a hyperopic eye?

- A. at optical infinity
- B. in front of the eye a finite distance away
- C. coincident with the nodal point
- D. behind the eye



Master Anatomy Exam
August 2021
Allowed Time: 3 hours

Essay Qs: Please discuss the following: : (5 marks each)

- 1-Discuss the detailed anatomy of the foramina of the orbit
- 2-Discuss the anatomy and embryology of the cornea
- 3-Discuss the anatomy of the nasociliary nerve and its applied anatomy

MCQs: Please choose the single best answer: (15 Marks)

- 1- Which one of the following bones is **NOT** part of the medial orbital wall?
 - A. Maxilla.
 - B. Ethmoid.
 - C. Sphenoid.
 - D. Palatine
- 2- Which orbital wall is the strongest?
 - A. Medial.
 - B. Inferior.
 - C. Lateral.
 - D. Superior.
- 3- The inferior oblique muscle is all, **EXCEPT**:
 - A. Has a 4 mm tendon.
 - B. Inserts near the foveal location.
 - C. Is connected to the ciliary ganglion.
 - D. Is the only muscle with an anterior origin.
- 4- The following structure is **ANTERIOR** to the grey line:
 - A. Meibomian gland orifices
 - B. Tarsal plate
 - C. Glands of Moll
 - D. The white line
- 5- Select the **CORRECT** description of autonomic innervation to the eye.
 - A. The iris sphincter muscle receives sympathetic innervation via the short ciliary nerves; the iris dilator muscle receives parasympathetic innervation via the short ciliary nerves.
 - B. The iris sphincter muscle receives parasympathetic innervation via the short ciliary nerves; the iris dilator muscle receives sympathetic innervation by the short ciliary nerves.
 - C. The iris sphincter muscle receives parasympathetic innervation via the short ciliary nerves; the iris dilator muscle receives sympathetic innervation via the long ciliary nerves.
 - D. The iris sphincter muscle receives parasympathetic innervation via the long ciliary nerves; the iris dilator muscle receives sympathetic innervation via long ciliary nerves.
- 6- The canal of Schlemm:
 - A. Lies posterior to the scleral spur
 - B. On average is 1 mm in long axis
 - C. Drains into the vortex veins
 - D. Is lined by endothelium

- 7- Which muscle inserts the farthest posterior to the limbus
- Medial rectus
 - Superior oblique
 - Superior rectus
 - Inferior rectus
- 8- The conjunctiva:
- Contains two geographical zones: palpebral and bulbar.
 - Contains lymphoid tissue.
 - Fuses with the optic nerve sheath.
 - Is composed of keratinized squamous epithelium.
- 9- Which of the following is **NOT TRUE** about the cornea?
- The tear-corneal epithelium surface forms a positive lens of approximately 40 D
 - The central cornea is steeper than the peripheral cornea
 - The average central corneal thickness is 500 to 550 μm
 - The anterior surface of the cornea is less curved than the posterior surface of the cornea
- 10- The corneal stroma does **NOT** contain
- type II collagen
 - type I collagen
 - type V collagen
 - type III collagen
- 11- The sclera is **NOT** characterized by that:
- It contains an endothelium lined sinus called Schlemm's canal
 - It has 4 middle apertures found 4 mm in front of the equator
 - It is 0.3 mm thick just behind the insertion of the recti
 - It is 0.6 mm thick at the equator
- 12- The following is **FALSE** about the superior oblique muscle:
- It becomes tendinous before reaching the trochlea
 - It is the primary extorter of the globe in the primary position
 - It acts as a pure depressor when the globe is adducted 51 degrees
 - It passes between the superior rectus and the globe on its way to its insertion
- 13- Choose the **CORRECT** statement:
- The inner plexiform layer is anterior to the inner nuclear layer.
 - The external limiting membrane is posterior to the rod/cone segments.
 - The ganglion cell layer carries the axons of the ganglion cells.
 - The outer plexiform layer contains the nuclei of the photoreceptors.
- 14- Which one of the extraocular muscles is served by a single nucleus that is shared by both oculomotor nerves?
- Superior rectus.
 - Medial rectus.
 - Inferior oblique.
 - Levator palpebrae superioris.
- 15- Which is **TRUE** regarding the visual pathway:
- Over 50% of the visual fibers decussate in the optic chiasm
 - Some fibers leave the optic radiation to connect to the pretectal area via the superior colliculus
 - Fibers from the contralateral optic nerve synapse in layers 1,3, and 6 in the lateral geniculate nucleus
 - Meyer's loop is formed by the inferior fibers of the optic radiation passing through the parietal lobe

***** Best of wishes *****



Examination for August Semester
MSc Degree
Physiology of The Eye

Time allowed: 3 hours
Total marks: 30 marks
All questions to be attempted

A) What is the Physiological basis of the following:

(3 points, 5 marks for each point)

1. Corneal dehydration
2. Outflow mechanism of Aqueous humor
3. Entoptic phenomenon of the eye

B) MCQ: Choose only one answer:

(15 points, 1 marks for each point)

- 1) The following is present in higher concentration in the tear than in the serum:
 - a) Sodium
 - b) Potassium
 - c) IgG
 - d) Glucose
- 2) The following fact is true about human tears:
 - a) The pH of tears is 6.0
 - b) The pH of tears is 7.4
 - c) Tears do not contain ammonia
 - d) Tears do not contain albumin

- 3) **Glucose metabolism in the lens principally occurs by:**
- Anaerobic glycolysis
 - Aerobic metabolism
 - Hexose monophosphate shunt
 - Sorbitol pathway
- 4) **When produced, aqueous humor passes out through the membranes of:**
- Trabecular meshwork
 - Corneal endothelial cells
 - Non-pigmented cells of the ciliary body
 - Pigmented cells of the ciliary body
- 5) **The principle of IOP measurement is defined by:**
- Schwalbe's equation
 - Poiseuille's law
 - Imbert-Fick principle
 - Holladay's equation
- 6) **The corneal stroma is mainly composed of:**
- Keratan sulphate
 - Chondroitin sulphate
 - It is acellular
 - Chondroitin phosphate
- 7) **Arrangement of stromal lamellae contributes to corneal transparency can be explained by:**
- Maurice theory
 - Schwalbe's equation
 - Imbert-Fick principle
 - Holladay's equation
- 8) **Which of the following is NOT a function of RPE?**
- Secretion of mucopolysaccharide
 - It plays a role in the embryological development of photoreceptors
 - Absorption of stray light
 - Adherence to other RPE cells via zona adherens to form the blood retinal barrier
- 9) **In phototransduction, activation of rhodopsin occurs via:**
- Isomerization of retinol
 - Glycosylation of transducing
 - Opening of GLUT-1 receptors
 - Unfolding of opsin

- 10) A number of corresponding points on the retina that projects to a definite single point in space:**
- a) The Auberg phenomenon
 - b) A horopter
 - c) Panum's area
 - d) The Pulfrich phenomenon
- 11) Which is the minimum threshold of Vernier hyperacuity?**
- a) 1 second of arc
 - b) 10 seconds of arc
 - c) 20 seconds of arc
 - d) 1 minute of arc
- 12) All of the following are true about amino acids content of the lens except:**
- a) Lens contains all types of amino acids
 - b) Concentration of amino acids are higher than vitreous
 - c) Not affected by aging, fasting or feeding protein-free diet
 - d) Actively transported inside the lens by lens epithelium
- 13) Which of the following methods can be used to isolate a cone response from the electroretinogram?**
- a) Dim background lightening conditions.
 - b) 50-Hz flicker
 - c) 10- Hz flicker
 - d) Single flash ERG
- 14) In cortical cataract, there is:**
- a) Increased protein content & increase in water insoluble fraction
 - b) Increased protein content & decrease in water insoluble fraction
 - c) Decreased protein content & increase in water insoluble fraction
 - d) Decreased protein content & decrease in water insoluble fraction
- 15) Regarding VEP, which of the following statements is NOT accurate?**
- a) VEPs are a measure of the response of the occipital cortex to visual stimulation
 - b) VEPs can be used to assess crossover of visual pathway fibers at the optic chiasm
 - c) An amblyopic eye will usually have an abnormal pattern and flash VEP
 - d) VEPs can be used to approximate the visual acuity

-- Good Luck --



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