



Tanta University, Faculty of Medicine,  
Department of Ophthalmology  
MD Examination  
[Final Semester]  
Ocular Physiology  
February, 2021

**All questions to be answered**  
**Exam Duration ( 3 ) hours**

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|--|-----------|
| 1. Discuss physiology of aqueous humor dynamics and clinical implications of drugs affecting intraocular pressure? | 5 degrees |
| 2. Discuss factors involved in control of ocular circulation   | 5 degrees |
| 3. Discuss briefly   |           |
| a. Autonomic innervation of iris muscles and pupillary reflexes in health and disease                              | 3 degrees |
| b. Factors determining the amount of medications that penetrate the cornea   | 2 degrees |

**Multiple choice questions: Choose only one answer**  
**(15 degrees, one degree for each question)**

- 1. The light reaction can be summarized as:**
- 11-cis retinol to all-trans retinal
  - All-trans retinal to 11-cis retinol
  - All-trans retinal to 11-cis retinol
  - 11-cis retinal to all-trans retinal



- 2. The first cell that an antigen typically contacts in the cascade of immune response is the**
- Plasma cell
  - Macrophages
  - B-lymphocyte
  - T-lymphocyte
- 3. Which statement is FALSE?**
- 39 degrees abduction isolates primary action of the oblique muscles (intort/extort)
  - 51 degrees abduction isolates secondary action of the oblique muscles (elevate/depress)
  - 23 degrees abduction isolates primary action of superior and inferior recti (elevate/depress)
  - 67 degrees adduction isolates secondary action of superior and inferior recti (intort/extort)
- 4. Which statement is TRUE regarding normal fusional vergence?**
- Normal vertical fusional vergence is 8-10 prism diopters
  - Normal Torsional fusional vergence is 2-3 degrees
  - Normal fusional convergence is 5-10 PD distance, and 15 PD near
  - Normal fusional divergence is 2-3 PD distance, and 3-5 PD near
- 5. All of the following are true of dark adaptation EXCEPT:**
- Rods are more sensitive than cons during dark adaptation
  - Organisms with only rods exhibit biphasic change
  - Dark adaptation may take up to 30 minutes
  - There is a shift in peak spectral sensitivity from 555 nm to 505 nm with dark adaptation
- 6. Regarding Botulinum toxin type A, which statement is FALSE:**
- Is one of eight serotypes
  - Induces sprouting of the nerve terminals as a consequence of paralysis
  - Prevents release of cholinergic vesicles
  - Is a competitive inhibitor of acetylcholine release from nerve terminals



**7. Which statement is FALSE? The transport of molecules across the lens surface:**

- a. Primarily utilizes the  $\text{Na}^+/\text{K}^+$  ATPase pump within the lens epithelium
- b. Including chloride and water involves an active transport mechanism
- c. Utilizes specific glucose transporters
- d. Utilizes specific ascorbate transporters
  
- e. Falling intracellular cGMP leads to closure of sodium channels, with subsequent further depolarization of the rod outer segment

**8. All is true regarding retinal ganglion cell axons EXCEPT:**

- a. Form the inner most nerve fiber layer of the retina
- b. Axons are unmyelinated inside the eye
- c. Impulse propagation inside the eye is faster than outside
- d. Organelles and molecules move bidirectionally inside the axons in an energy dependent manner

**9. A complex cell in the visual cortex:**

- a. Responds best to lines - but requires visual input from both eyes
- b. Responds best to moving lines of any orientation
- c. Responds best to angles
- d. Responds maximally when a line is anywhere in its receptive field providing it is in the correct orientation

**10. Which one of the following concerning tear secretion is FALSE?**

- a. The basal, continual tear secretion is maintained by the accessory lacrimal glands of Krause and Wolfring
- b. Basal tear secretion is maintained by parasympathetic innervation
- c. Both sympathetic and parasympathetic nerve stimuli are important for reflex tear secretion
- d. Conjunctiva and Meibomian glands also contribute to the tear film

**11. In visual field testing, which statement is FALSE?**

- a. An isopter is defined as the boundary between visible and invisible points in response to the same threshold stimulus
- b. A nasal step signifies a localized indentation within the isopter
- c. Contracted field means the boundaries of the isopter approaches fixation in all meridians





- d. An absolute scotoma signifies a defect that persists with the brightest and largest stimulus used in the machine

**12. Which one of the following characteristics of the retinal pigment epithelium is NOT correct?**

- a. Active  $\text{Na}^+ - \text{K}^+$  pump on the basal surface to maintain the ion gradient in the interphotoreceptor matrix
- b. Contributes to blood-retina barrier
- c. Contributes to adhesions of sensory retina
- d. Involved in isomerization of vitamin A

**13. In presbyopia (reduced accommodation with ageing), which statement is TRUE**

- a. **The accommodation response decreases because the lens loses its elasticity**
- b. The accommodation effort exerted by ciliary muscle contraction decreases
- c. Parasympathetic activity as part of the near reflex is reduced
- d. Zonular stiffness prevents increased convexity and forward displacement of the lens

**14. Which one of the following concerning the effects of light on rod outer segment metabolism is FALSE?**

- a. Light absorption leads to configurational changes in rhodopsin and activation of transducing
- b. Transducing, through an amplification cascade, activates phosphodiesterase
- c. Phosphodiesterase causes a fall in cyclic guanosine monophosphate (cGMP) levels
- d. Falling intracellular cGMP leads to closure of sodium channels, with subsequent further depolarization of the rod outer segment

**15. A junctional scotoma in the visual field due to lesion at junction of optic nerve and chiasm comprises**

- a. A centrocecal scotoma in both eyes
- b. A centrocecal scotoma in ipsilateral eye and upper temporal field defect in contralateral eye
- c. A centrocecal scotoma in ipsilateral eye and a hemianopic field defect in the contralateral eye
- d. A centrocecal scotoma in ipsilateral eye and upper nasal field defect in the contralateral eye



**Tanta University**

**Faculty of Medicine**

**Ophthalmology Department**

**MD Exam in Optics**

Date: February 28<sup>th</sup> 2021

Time allowed: 3 hours.

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**Part I:**

**Write in the following 3 items (5 Marks each)**

1. Interference of light and its clinical applications.
- 2-Schematic and reduced eye.
- 3-Optical principles of lensometer.

**Part 2:**

**MCQ questions (2 Marks each)**

**Choose one answer**

**1. The purpose of Q-switching a laser is to:**

- a. increase energy, increase power
- b. decrease energy, increase power
- c. decrease energy, decrease power
- d. increase energy, decrease power

**2. The Prentice position refers to;**

- a. glass prism perpendicular to visual axis
- b. glass prism in frontal plane
- c. plastic prism perpendicular to visual axis
- d. plastic prism in frontal plane

**3. A Galilean telescope with a +5 D objective and a -20 D eyepiece produces an image with what magnification and direction?**

- a. 4× erect
- b. 4× inverted
- c. 100× erect
- d. 100× inverted

4. A convex mirror produces what type of image?
- virtual, inverted, magnified
  - real, inverted, minified
  - real, erect, magnified
  - virtual, erect, minified
5. A refraction with a stenopeic slit gives the following measurements:  $+1.00$  at  $90^\circ$  and  $-2.00$  at  $180^\circ$ . The corresponding spectacle prescription is:
- $-2.00+1.00 \times 90$
  - $-2.00+1.00 \times 180$
  - $-2.00+3.00 \times 180$
  - $+1.00+3.00 \times 90$
6. The image of a distant object is largest in which patient?
- aphake with contact lens
  - hyperope with spectacles
  - emmetrope
  - myope with spectacles
7. A person looking at an object 5 m away through a  $10 \Delta$  prism placed base-in over the right eye would see the image displaced:
- 20 cm to the right
  - 50 cm to the right
  - 20 cm to the left
  - 50 cm to the left
8. After cataract surgery, a patient's refraction is  $-0.75 + 1.75 \times 10$ , in what meridian should a suture be cut to reduce the astigmatism?
- $180^\circ$
  - $100^\circ$
  - $90^\circ$
  - $10^\circ$
9. What is the appropriate correction in the IOL power if the A constant for the lens to be implanted is changed from 117 to 118?
- decrease IOL power by 1.0 D
  - increase IOL power by 1.0 D
  - decrease IOL power by 0.5 D
  - increase IOL power by 0.5 D
10. The total cylindrical power of a 0.50 D cross cylinder is:
- plano
  - 0.25 D
  - 0.50 D
  - 1.00 D



**segment style is:**

- a. flat top
- b. progressive
- c. round top
- d. executive

**12. During retinoscopy, when neutralization is reached, the light reflex is:**

- a. narrowest and slowest
- b. narrowest and brightest
- c. widest and slowest
- d. widest and fastest

**13. A patient undergoing fogged refraction with an astigmatic dial sees the 9 to 3 o'clock line clearer than all the others. At what axis should this patient's minus cylinder correcting lens be placed?**

- a.  $30^\circ$
- b.  $45^\circ$
- c.  $90^\circ$
- d.  $180^\circ$

**14. What is the ratio of the magnification from a direct ophthalmoscope to the magnification from an indirect ophthalmoscope with a 20 D lens at a distance of 25 cm if the patient and examiner are both emmetropic?**

- a. 15:2
- b. 10:3
- c. 5:1
- d. 4:1

**15. To increase the magnification of the image during indirect ophthalmoscopy, the examiner should:**

- a. move closer to the condensing lens
- b. move the eyepiece prisms farther apart
- c. use a higher dioptric power condensing lens
- d. remove the plus lens in the eyepiece

**GOOD LUCK**