ROYAL CIVIL SERVICE COMMISSION
BHUTAN CIVIL SERVICE EXAMINATION (BCSE) 2023
EXAMINATION CATEGORY: TECHNICAL

PAPER III: SUBJECT SPECIALISATION PAPER FOR OPTOMETRY

Date	: October 7, 2023
Total Marks	: 100
Writing Time	: 150 minutes (2.5 hours)
Reading Time	: 15 minutes (prior to writing time)

GENERAL INSTRUCTIONS:

1. Write your Registration Number clearly and correctly on the Answer Booklet.
2. The first 15 minutes is to check the number of pages of Question Paper, printing errors, clarify doubts and to read the instructions. You are NOT permitted to write during this time.
3. This paper consists of **TWO SECTIONS**, namely SECTION A & SECTION B:
   - **SECTION A** has two parts: Part I - 30 Multiple Choice Questions
     Part II - 4 Short Answer Questions

     All questions under SECTION A are COMPULSORY.
   - **SECTION B** consists of two Case Studies. Choose only **ONE** case study and answer the questions of your choice.
4. All answers should be written on the Answer Booklet provided to you. Candidates are not allowed to write anything on the question paper. If required, ask for additional Answer Booklet.
5. All answers should be written with correct numbering of Section, Part and Question Number in the Answer Booklet provided to you. Note that any answer written without indicating the Section, Part and Question Number will NOT be evaluated and no marks will be awarded.
6. Begin each Section and Part in a fresh page of the Answer Booklet.
7. You are not permitted to tear off any sheet(s) of the Answer Booklet as well as the Question Paper.
8. Use of any other paper including paper for rough work is not permitted.
9. **You must hand over the Answer Booklet to the Invigilator before leaving the examination hall.**
10. This paper has **8 printed pages**, including this instruction page.

GOOD LUCK

SECTION A

PART I: Multiple Choice Questions [30 marks]

Choose the correct answer and write down the letter of your chosen answer in the Answer Booklet against the question number e.g. 31 (d). Each question carries ONE mark. Any double writing, smudgy answers or writing more than one choice shall not be evaluated.

1. The term "modulus of elasticity" is often used in relation to contact lenses. What does this term refer to?
   a) Lens flexibility and how it conforms to the eye
   b) Lens permeability to oxygen and moisture
   c) Lens resistance to microbial growth
   d) Lens ability to correct astigmatism

2. Which diagnostic technique is often used to visualize the retina and its detachment, using a colored dye injected into a vein in the arm?
   a) Optical coherence tomography (OCT)
   b) Fluorescein angiography (FFA)
   c) Electroretinography (ERG)
   d) B-scan ultrasound (USG)

3. A 40-year-old patient presents with diplopia and ptosis in one eye. You suspect an ocular motility disorder involving the oculomotor nerve. Which specific muscle is likely to be affected?
   a) Lateral rectus
   b) Medial rectus
   c) Superior oblique
   d) Levator palpebrae superioris

4. When fitting a contact lens, the relationship between the curvature of the cornea and the base curve of the lens is crucial. What term describes the difference between these two curvatures?
   a) Eccentricity
   b) Deviation quotient
   c) Sagittal depth
   d) Apical clearance

5. What optical device used by individuals with low vision combines a telescope for distance viewing in the upper portion with a near-vision magnifier in the lower portion?
   a) Fresnel prism
   b) Bioptic telescope
   c) Monocular telescope
   d) Perimeter

6. Which retinal disease, often associated with aging, leads to central vision loss while peripheral vision remains intact, resulting in difficulty reading and recognizing faces?
   a) Glaucoma
   b) Retinitis pigmentosa
   c) Diabetic retinopathy
   d) Macular degeneration

7. A person with low vision is finding it difficult to distinguish between similar colors. Which type of visual aid can enhance color perception and improve color differentiation?
   a) Tinted glasses
   b) Anti-reflection coated glasses
   c) Prism glasses
   d) Telescopic glasses

8. A patient has a cylindrical prescription for astigmatism correction which reads -1.25 / -2.00 x 180. What do the numbers represent?
   a) Sphere, cylinder, axis
   b) Cylinder, sphere, axis
   c) Axis, sphere, cylinder
   d) Cylinder, axis, sphere

9. Which of the following statements on ocular physiology is NOT TRUE?
   a) The blind spot in the retina is associated with the optic disc
   b) The aqueous humor is produced by the ciliary body
   c) Rod cells are primarily responsible for scotopic vision
   d) The ganglion cell layer contains photoreceptor cells

10. Which of the following systemic diseases and ocular manifestations do not match?
    a) Uveitis : Sarcoidosis
    b) Scleritis : Arthritis
    c) Keratitis: Anemia
    d) Cataract : Diabetes

11. Pemala, 55-year-old male presents to you with sudden, painless vision loss in one eye. Fundus examination reveals a cherry-red spot in the macula. Which condition is most likely?
    a) Central retinal artery occlusion
    b) Retinitis pigmentosa
    c) Retinal detachment
    d) Glaucoma

12. “With movement” in retinoscopy without the working distance is seen in all EXCEPT
    a) Myopia of more than +1.50D
    b) Myopia of less than +1.50D.
    c) Emmetropia
    d) Hypermetropia

13. The primary goal of low vision rehabilitation is to
    a) Completely restore normal vision
    b) Provide optical corrections for refractive errors
    c) Maximize functional vision and enhance independence
    d) Prevent the progression of visual impairment

14. A patient has a visual acuity of 20/100. If the patient can read a letter at a distance of 20 feet that a person with normal vision can read at 100 feet, what is the patient's visual acuity in decimal notation?
    a) 0.20
    b) 0.50
    c) 1.00
    d) 2.00

15. Which type of cataract is characterized by white, wedge-shaped opacities that start from the periphery of the lens and progress toward the center?
    a) Zonular cataract
    b) Cortical cataract
    c) Nuclear cataract
    d) Lamellar cataract

16. In a Humphrey visual field test report, what does the term "Mean Deviation" represent?
    a) The average difference between the patient's visual field and a normal visual field.
    b) The overall field loss in decibels (dB) across the visual field.
    c) The average sensitivity of the central visual field.
    d) The mean duration of the visual field test.

17. Presbyopia is a common age-related vision condition. What is the primary cause of presbyopia?
    a) Lens opacification
    b) Corneal irregularities
    c) Loss of lens flexibility
    d) Retinal degeneration

18. In ophthalmic dispensing, which of the following abbreviation is INCORRECT?
    a) PD: Pupillary distance
    b) ARC: Anti-reflective coating
    c) HVD: Horizontal visible distance
    d) PAL: Progressive addition lenses

19. In the SRK formula, which additional constant is used to fine-tune the IOL power calculation based on surgeon-specific outcomes and equipment?
    a) A-constant
    b) B-constant
    c) L-constant
    d) K-constant

20. In the Snellen chart, if a person reads the line of letters corresponding to "6/60" with one eye and "6/12" with the other eye, what is the term for this difference in visual acuity between the eyes?
    a) Binocular rivalry
    b) Aniseikonia
    c) Dichoptic imbalance
    d) Monocular discordance

21. Which assistive technology device is designed to convert printed text into synthesized speech for individuals with low vision?
    a) Braille display
    b) Screen magnifier
    c) Tactile graphics embosser
    d) Optical character recognition (OCR) system

22. Scleral contact lenses are effective for managing dry eye symptoms due to their ability to:
    a) Increase corneal sensitivity
    b) Decrease tear production
    c) Trap a reservoir of saline against the cornea
    d) Cause further irritation to the ocular surface

23. Which factor is crucial when fitting progressive addition lenses to ensure optimal comfort and visual performance?
    a) Prescription strength only
    b) Pupil size only
    c) Frame style and size
    d) Age of the patient only

24. What type of lens aberration can cause blurriness and distortion in the peripheral areas of a progressive addition lens?
    a) Coma
    b) Spherical aberration
    c) Chromatic aberration
    d) Oblique astigmatism

25. What percentage of congenital nasolacrimal duct obstruction typically resolve without intervention as the infant grows?
    a) Less than 10%
    b) Approximately 25%
    c) Approximately 50%
    d) More than 75%

26. What is the term for the phenomenon where a prism causes a shift in perceived object position due to the bending of light?
    a) Prismatic aberration
    b) Prismatic dispersion
    c) Prismatic effect
    d) Prismatic shift

27. Sympathetic ophthalmoplegia is often caused by damage to the sympathetic nerve pathways, usually due to:
    a) Excessive UV exposure
    b) Infections like conjunctivitis
    c) Ocular injury or trauma
    d) Nasolacrimal duct obstruction

28. Which ophthalmic drug is often used to prevent infection in contact lens wearers and treat bacterial conjunctivitis?
    a) Mast cell stabilizers
    b) Antiviral agents
    c) Antibiotics
    d) Steroids

29. Which of the following statements is NOT true regarding ophthalmic epidemiology in Bhutan?
    a) Bhutan was declared 'Trachoma Free' in 2022
    b) Cataract is still the leading cause of visual impairment
    c) There was a 33% reduction in the prevalence of blindness between 2009 and 2018
    d) The most common cause of visual impairment in school children is refractive error

30. The Ishihara color blindness test is a widely used test that assesses a person's ability to distinguish:
    a) Blue and yellow colors
    b) Red and green colors
    c) Black and white colors
    d) Red and blue color

PART II – Short Answer Questions [20 marks]

This part has 4 Short Answer Questions. Answer ALL the questions. Each question carries 5 marks.

1. What are the grades of binocular vision? Briefly describe them. **(5 marks)**

2. Perform the following calculations.

    a) Convert the prescription to spherical equivalent: -2.00/-1.00 x 90 **(1 mark)**

    b) Transpose to minus cylinder: +1.50/+1.50 x 80 **(1 mark)**

    c) Calculate the contact lens prescription for -6.00/-3.00 x180 assuming the vertex distance of 12 mm**. (3 marks)**

3. With a help of diagram, briefly describe the boxing system in ophthalmic dispensing. **(5 marks)**

4. Write a short note on signs and symptoms of anterior uveitis. **(5 marks)**

SECTION B: Case Study [50 marks]

Choose either CASE I OR CASE II from this section. Each case study carries 50 marks. Mark for each sub-question is indicated in the brackets.

CASE I

A 39-year-old man working as a welder in a ferrosilicon industry in Pasakha presented to your eye outpatient department (OPD) for a routine follow-up.

The patient had a history of being diagnosed with bilateral corneal dystrophy at the age of 25. He underwent penetrating keratoplasty in the right eye 5 years ago with no procedures done in the left eye.

Ophthalmic examination revealed the following:

Sl#	Parameters	OD	OS
1	Uncorrected distance VA	6/60	2/60
2	Retinoscopy	-1.50/-6.25 x 50	Dull reflex
3	Best corrected VA/Pinhole VA	6/24	5/60
4	Visual acuity at 40 cm	N18	N36
5	Intraocular pressure (Applanation)	18 mmHg	16 mmHg
6	OCT	CDR:0.7 Rest normal	Not visible

The patient wants PKP in the left eye but the eye bank has no cornea due to lack of donors.
Based on the above information, answer the following questions.

1. What is corneal dystrophy? What are the different types of corneal dystrophy? (**3 marks)**
2. Write in detail regarding history taking and ophthalmic examination as follow-up for this patient. **(8 marks)**
3. What is penetrating keratoplasty? List down three indications of penetrating keratoplasty. (**3marks)**
4. As an optometrist, what specialized services would you offer to help the patient? Describe in detail. **(6 marks)**
5. What is the type of astigmatism in the right eye? Draw a ray diagram to show the type of astigmatism. (**4 marks)**
6. List three causes of dull reflex during retinoscopy and possible ways to troubleshoot it. **(6 marks)**
7. Does the patient fall under the low vision category? Define low vision. **(3 marks)**
8. Write down the working principle of applanation tonometry. (**5 marks)**
9. What is OCT? What are the different types of OCT? (**3 marks)**
10. List the common ocular injuries among construction workers in Bhutan? (**4 marks)**
11. What are the potential causes of poor harvest of cornea in Bhutan? How can we overcome it? **(5 Marks)**

CASE II

A 10-year-old male child was brought to you with a complaint of redness and mild pain in the left eye with a small nodular growth on the temporal limbus for 2 weeks. She had no complaint of discharge or itching of her eyes. The child was not using any refractive correction. On examination, the following was revealed:

Sl#	Parameters	OD	OS
1	Uncorrected distance VA	20/30	20/200
2	Dry retinoscopy	-0.75 DS	-8.50 DS
3	BCVA	20/20	20/80
4	Wet retinoscopy	-0.75 DS	-8.00 DS

Based on the above information, answer the following questions carefully.

1. What is the most probable diagnosis for the child complaint? (**2 marks)**

2. What are the differential diagnosis of red eyes? How would you confirm your diagnosis in this case? (**8 marks)**

3. Describe the management and follow-up plan for this child in detail. (**10 marks)**

4. With the help of a diagram explain the working principle of a retinoscope. (**4 marks)**

5. Convert the uncorrected visual acuity in meter notation. (**2 marks)**

6. Draw a labeled diagram to show the potential changes visible in the fundus of the left eye. (**5 marks)**

7. Would the child be able to wear the spectacle comfortably if you prescribed the full wet retinoscopy prescription? Why? (**3 marks)**

8. Would you recommend LASIK for this patient? Why? (**3 marks)**

9. What advice would you give to the parents to halt/slow the progression of myopia? (**5 marks)**

10. List down cycloplegic drugs commonly used along with its tonus allowance deduction recommended for post-cycloplegic refraction. (**3 marks)**

11. Recommend strategies for early detection of refractive error in children. (**5 marks)**

TASHI DELEK