Level 6 Certificate in Contact Lens Practice

Unit 2 – Visual Optics

Principal Examiner:
J Underwood MSc BSc (Hons) FBDO (Hons) CL (Hons) SLD
SMC(Tech) FEAOO CertEd

Summer 2024
Duration: 2 hours

Candidate Number:

Date: ☐☐/☐☐/☐☐

Seating Location:

Answer **four** questions only.

Please tick below the numbers of the questions attempted:

| 1 ☐ | 2 ☐ | 3 ☐ | 4 ☐ | 5 ☐ |

☐　Number of Supplementary Sheets used (if any), including graph paper.

For office use only

Question number	1	2	3	4	5	Total Overall	%
Marks							
Moderated							
Borderline (57%-62%)	Please tick the box to acknowledge that this is a borderline result and confirm that the marks have been checked in terms of allocation and addition.					☐	

Examiner's Signature		Moderator's Signature	

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Question 1

i)   **Explain** Drysdale's method for determining the radius of curvature of a convex or concave reflecting surface. **(20 marks)**

ii)   **Describe** the optical arrangement of the radiuscope.

        Include 5 statements of fact. **(15 marks)**

iii)   In the outline of a radiuscope below, 🖊 **label** the following components:

- Objective lens
- Eyepiece lens
- Light source
- Aerial image

🖊 **Draw in and label:**

- Mirror
- Path of light through the instrument. **(10 marks)**

iv)   **State** <u>two</u> ways to visually identify the difference between the surface image and the aerial image. **(10 marks)**

v)   **State** why water or saline must be placed between the lens and its holder prior to a reading being taken. **(5 marks)**

vi)   **State** other rigid lens parameters that can be verified using the radiuscope, including a brief description of the methods used. **(20 marks)**

vii)   **Explain** how the instrument would be modified for use with soft lenses. *Include 4 points*. **(10 marks)**

viii)   When using the radiuscope to measure the radius of a soft lens the focused surface image reads 2.70mm and the aerial image reads 9.20mm. If the refractive index of saline is 1.336, **calculate** the BOZR of the lens. **(10 marks)**

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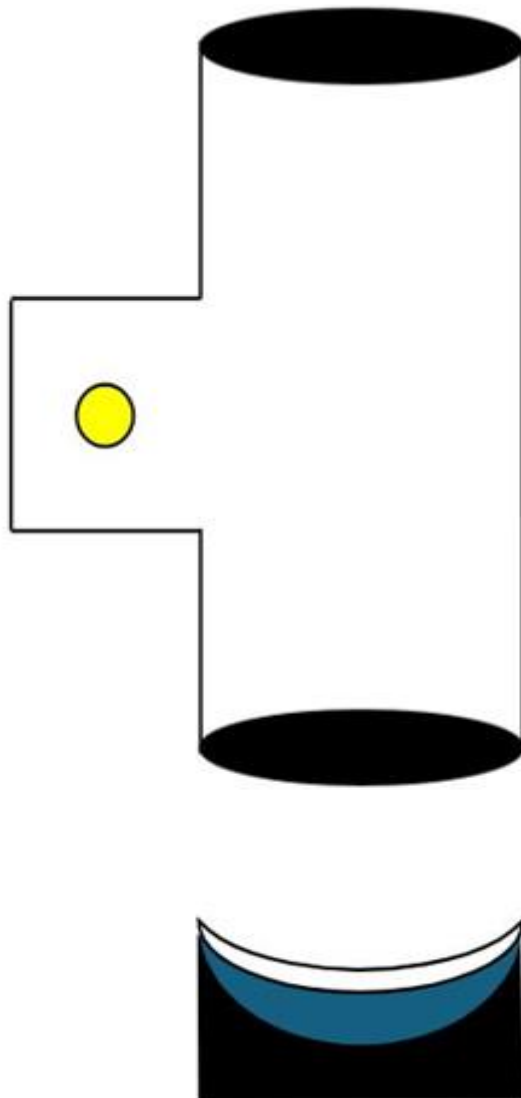
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Question 2

i)   **Discuss** the types, advantages and disadvantages of
      simultaneous vision bifocal contact lenses.
      You should include at least 8 facts, which may include
      diagrams.   **(32 marks)**

ii)   A back surface centre-distance solid concentric bifocal
      contact lens is made to the following specification:
      Distance Rx   +2.50DS
      Reading addition   +3.00DS
      Centre thickness   0.18mm
      Refractive index   1.46

      The outer portion of the lens fits in alignment with the spherical
      cornea, which has a spherical keratometry reading of 8.10mm.

      Calculate the surface radii required if the refractive index of
      the tears is 1.336.   **(48 marks)**

iii) **State** two advantages and two disadvantages of back surface
      bifocal contact lenses.

                                                               (20 marks)

                                                               (6 marks)

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iii) **State** two advantages and two disadvantages of back surface bifocal contact lenses. **(20 marks)**

Question 3

i)   An eye with a **spectacle** refraction of +5.50DS is corrected for distance vision at a vertex distance of 14mm by a spectacle lens with the following details;

     F_2 -4.00DS
     Centre thickness   3.80mm
     Refractive index   1.67

     ▤ Calculate the spectacle magnification if the entrance pupil lies 3mm behind the cornea.

(40 marks)

ii) The same eye is now corrected for distance vision by an RGP contact lens with the following specification;

     BOZR   8.15mm
     Centre thickness   0.18mm
     Refractive index   1.46

     This contact lens has a clearance of 0.10mm and the spherical corneal radius is 8.05mm.

     ▤ Calculate the spectacle magnification produced by this contact lens system, if the refractive index of the tears is 1.336.

(60 marks)

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This contact lens has a clearance of 0.10mm and the spherical corneal radius is 8.05mm.

▣ **Calculate** the spectacle magnification produced by this contact lens system, if the refractive index of the tears is 1.336.   **(60 marks)**

Question 4

Write short notes on any **THREE** of the following: **(100 marks)**

i)   The construction, use and limitations of simple subjective optometer

ii)   Methods of classification of regular astigmatism in the eye

iii)   Construction and uses of the duochrome

iv)   Construction of Snellen letters and the use of the Snellen fraction

You should include 9 facts for each topic, ✏ which may include diagrams.

Question 5

i) A soft contact lens is to be made to the following specification:

BOZR	9.20mm
TD	14.20mm
BVP	-3.25D
tc	0.12mm
Ref. index(hydrated)	1.45
(dehydrated)	1.52
Hydration factor	27%

▮**Find** all the specifications for this lens in its <u>dehydrated </u>state.   **(50 marks)**

ii) If the hydration factor is subsequently found to be 23%, **what** is the error in the BVP of the finished <u>hydrated</u> lens?   **(30 marks)**

iii) **Write short notes** on the lathe cutting method of manufacture of soft contact Lenses, including advantages and disadvantages of the method.
You should include 5 facts.   **(20 marks)**

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End of questions for this paper

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DO NOT TURN THIS PAPER OVER UNTIL ADVISED TO DO SO BY THE INVIGILATOR

Important Instructions to Candidates

Please read carefully and follow these instructions when told to do so by the Examiner/Invigilator.

1.   You will be given 5 minutes at the beginning of the examination to read through the questions.

2.   **Please enter your candidate number and date in the boxes on the front cover of this booklet.**

3.   Please **DO NOT write your name** on the booklet. Candidates must remain anonymous for marking purposes.

4.   Candidates must answer questions legibly, using blue/black ink or ball-point pen. *Pencil may be used for graphs and diagrams only.*

5.   Candidates please note, the examination paper has been designed for you to answer the stated number of questions within the allotted time.

6.   Candidates must read each question carefully and make sure that you know what you have to do before starting your answer.

7.   Candidates must write the answer to each question in the space provided. Additional paper may be used if necessary but you must show your Candidate Number and question number(s) clearly at the top of each page.

8.   Please do not write in the margins.

9.   Any extra pages used should be securely fastened together using a treasury tag. This includes any diagrams, additional graph paper or any continuation paper.

10.   Candidates are advised to carefully cross out any work not intended to be marked by the Examiner.

11.   Please do not tear out any part of this booklet. All work must be handed in.

Important Information for Candidates

1.   Answer **four** questions only.

2.   Answer all parts for each question.

3.   Candidates MUST work to at least 4 decimal places in ALL calculation questions and they will be penalised if this is not done.

4.   Where relevant, the marks awarded for each part of a question are given in brackets, e.g. **(10 marks)**.

5.   ✏ ▤ These symbols indicate that a diagram/calculation is required or a diagram needs annotating.

6.   This entire document consists of 20 pages. Any blank pages are indicated.

When told to do so by the Invigilator, you may turn the paper over and begin.