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OPHTHALMIC BASIC SCIENCE EXAMINATIONS
OPTICS
13 October 2009

Duration of paper: **3 hours** **Total Marks: 120**
Total No. of questions: **12 (10 marks each)**

- **Candidates must attempt all questions**
- **Write your answers in the answer pad using CLEAR and LEGIBLE writing, use diagrams and point form where appropriate**
- **Start a new page for each question; do not write on the reverse of any answer page. Make sure to put your candidate number on each page**
- **If you cross out an area of your own writing, it will not be considered by the examiners**

Question 1
Describe the physical principles of the different types of lasers used in ophthalmology (do not include details of their clinical uses).

Question 2
Describe the phenomena of:
a) diffraction of light.
b) scattering of light.

Question 3
Describe polarization of light and its uses in ophthalmology.

Question 4
a) What is ultrasound, and how is it produced?
b) Describe A-mode, B-mode and Doppler ultrasound, and their uses in ophthalmology.

Question 5
a) What is a Fresnel prism?
b) Compare and contrast the advantages and disadvantages of Fresnel and standard prisms.

Question 6
Define and differentiate between each of the three different types of magnification.

Question 7
What are the reasons for an eye becoming more myopic in low illumination?

Question 8
- **a)** Draw a diagram of a reduced schematic eye (include dimensions, dioptric powers, and refractive indices).
- **b)** A Snellen letter of height 60 mm is 6 metres from the eye. Calculate the size of the retinal image.

Question 9
- **a)** Illustrate with diagrams the position of the far point of a simple hypermetropic and myopic eye.
- **b)** Where must a lens be placed to correct the ametropia in each case?
- **c)** What are the effects on the image when the correcting lens is moved closer to the eye in each case?

Question 10
- **a)** What does the keratometer actually measure, and what principle does it use to do this measurement? Use a ray diagram to illustrate your answer.
- **b)** What assumptions are made when this measurement is used to obtain the corneal power?

Question 11
Describe the physical and optical principles of the applanation tonometer.

Question 12
To obtain the required power of an intra-ocular lens, the length of the eye must be measured. Describe the methods used and their limitations.

END OF PAPER