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OPHTHALMIC BASIC SCIENCE EXAMINATIONS
OPTICS
6 March 2007

Duration of paper: **3 hours** **Total Marks: 180**
Total No. of questions: **18 (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
Explain the differences between the wave and particle theory of light.
Give examples of different phenomena in which each theory is more useful.

Question 2
Describe the behaviour of light passing through a small circular aperture.

Question 3
Describe accommodation, its range, amplitude and methods used to measure it.

Question 4
Direct ophthalmoscopy has been used for a long time to examine the posterior segment of the eye. Explain its optical principles.

Question 5
Discuss the six cardinal points of an optical system. How do these cardinal points apply to a thin glass lens in air?

Question 6
Discuss the optics of a diffraction-based multifocal intraocular lens.

Question 7
Discuss polarization of light and its application in ophthalmology.

Question 8
Keratometry is an essential part of the pre-operative assessment of patients before cataract surgery. Describe the optical principles of manual keratometry.

Question 9
Discuss what happens to light traveling through a glass plate when it reaches the interface between glass and air.

Question 10
Discuss coma and oblique astigmatism.

Question 11
Astigmatism is a common refractive error that is amenable to correction. Describe regular astigmatism as applicable to the human eye and the optical principles of its correction.

Question 12
Patients with macular degeneration may find magnifiers helpful. Discuss the optical principle of a simple magnifier.

Question 13
Laser light has unique properties that distinguish it from "natural light". Discuss these properties.

Question 14
Discuss equivalent power, back vertex power and what is meant by the spectacle plane.

Question 15
Jackson's cross cylinder is used to refine subjective refraction. Describe the steps used.

Question 16
What types of eyepieces do you know? What design features improve their performance?

Question 17
When measuring ocular deviation, the amount of deviation is usually expressed in "prism dioptres". Explain this term.

Why is it important to hold a glass or a plastic prism in a particular way when measuring the amount of ocular deviation?

Question 18
Retinoscopy is a useful method for judging the cylinder axis for correction of astigmatism. Describe the different ways for judging the cylinder axis during retinoscopy.

END OF PAPER