



University of Choice

**MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY
(MMUST)**

MAIN CAMPUS

**UNIVERSITY EXAMINATIONS
2022/2023 ACADEMIC YEAR**

**MAIN EXAMS
FOR FIRST YEAR SECOND TRIMESTER EXAMINATION FOR**

MASTER OF SCIENCE IN OPTOMETRY

COURSE CODE: MOV 823

COURSE TITLE: NEUROPHYSIOLOGY AND PSYCHOPHYSICS OF VISION

DATE: 17/4/2023

TIME: 2.00-5.00 PM

INSTRUCTIONS TO CANDIDATES: ANSWER ALL QUESTION

TIME: 3 Hours

MMUST observes ZERO tolerance to examination cheating

QUESTION ONE

- (a) An optometrist described the retina as a transducer
- (i) Define a transducer (1 mark)
 - (ii) How does the retina qualify as a transducer (2 marks)
- (iii) Describe how the transduction in the retina in a) above is achieved (3 marks)
- (iv) State the similarity between the retina and a solar cell (2 marks)
- (b) The retina is said to consist of photoreceptive cells
- (i) What do you understand by a photoreceptive cell? (2 marks)
 - (ii) Name two such photoreceptive cells (2 marks)
- (c) Differentiate between the two types of photoreceptive cells in b) in terms of the following;
- (i) Their functions
 - (ii) Their spread in the retina
 - (iii) Light levels operated in
- (6 marks)

QUESTION TWO

- (a) What do you understand by optic nerve (2 marks)
- (b) Briefly describe the function of the optic nerve (2 mark)
- c) The optic nerve carries information from the retina to the brain
- (i) On a sketch show the path of optic nerves carrying information from the retina in the two eyes, to the primary visual cortex, showing the important points along the path (3 marks)
 - (ii) Briefly describe the function of the primary visual cortex (2 marks)
 - (iii) How is the primary visual cortex functionally different from the visual association cortex (2 marks)

QUESTION THREE

(a) Although the electromagnetic spectrum runs from the low energy radio waves to high energy gamma rays, the human eye is only able to detect a narrow window

(i) Describe the visible light spectrum in terms of colours and wavelengths

(2 marks)

(ii) Cortical colour processing may be understood using the trichromatic theory and opponent process theory. Briefly state what each theory helps explain

(2 marks)

(iii) Using the opponent process theory describe how colour opponency occurs during neural processing stage. Hence explain why we do not see reddish-green or yellowish-blue colours

(3 marks)

(b) One of the higher-level cortical processes is Depth perception

(i) What do you understand by depth perception

(2 marks)

(ii) How does the brain use the relative sizes of objects to determine how close they are

(1 mark)

(iii) Describe the overlapping cue used by the brain in depth perception

(2 marks)

QUESTION FOUR

(a) Doctors use Functional magnetic resonance imaging (fMRI) technique to guide brain treatment

(i) What exactly does fMRI measure

(2 marks)

(ii) How is fMRI different from the ordinary MRI

(2 marks)

(iii) State two advantages of fMRI over the MRI

(2 marks)

b) (i) What is object recognition as used in psychology

(3 marks)

(ii) Object recognition is said to go well beyond vision to cognitive process. Describe two such cognitive processes

(3 marks)

(iii) Describe two stages in object recognition

(3 marks)

c) The science of optometry and Ophthalmology deal with different vision and the neurologist works with both

(i) What is the difference between optometry and ophthalmology?

- (ii) Describe the work of a neurologist (2 marks)
(2 marks)

QUESTION FIVE

- (a) The eye is the object of vision
- (i) With the aid of a sketch show four parts of the eye where rays from objects pass through before landing on the retina (5 marks)
 - (ii) List the four parts in i) above in decreasing order of bending ability (2 marks)
 - (iii) Describe how the light from an object is focused onto the retina (2 marks)
- (b) A common a eye problem is short sightedness.
- (i) With the aid of a sketch show how this comes about. (2 marks)
 - (ii) State a possible remedy for the problem in iv above (1 mark)

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