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BRAINWARE UNIVERSITY

Term End Examination 2025-2026

Programme – B.Optomtry-2022/B.Optomtry-2023/B.Optomtry-
2024/B.Optomtry-2025

Course Name – Ocular Biochemistry

Course Code - BOPTOC203

(Semester II)

Full Marks : 60

Time : 2:30 Hours

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A

(Multiple Choice Type Question)

1 x 15=15

1. Choose the correct alternative from the following :

- (i) What is a common ocular sign of Hypothyroidism?
 - a) Proptosis (bulging)
 - b) Loss of lateral eyebrow hair
 - c) Lid retraction
 - d) Conjunctival congestion
- (ii) In the mechanism of Thyroid Eye Disease (TED), what causes the eyes to push forward?
 - a) Lack of sleep
 - b) Thinning of the optic nerve
 - c) Inflammation, edema, and fibrosis of orbital fat and muscles
 - d) Increased tear production
- (iii) Which principle explains the movement of molecules during electrophoresis?
 - a) Molecules move based on their temperature in the buffer.
 - b) Negatively charged molecules move toward the anode, while positively charged molecules move toward the cathode.
 - c) Light absorption determines the speed of the molecules.
 - d) All molecules move toward the negative electrode regardless of charge.
- (iv) Which type of electrophoresis is specifically used to separate proteins based on their isoelectric point (pI)?
 - a) Agarose Gel Electrophoresis
 - b) SDS-PAGE
 - c) Isoelectric Focusing (IEF)
 - d) 2D Gel Electrophoresis
- (v) Which technique is most appropriate for analyzing microbial DNA to identify ocular pathogens?
 - a) SDS-PAGE
 - b) Colorimetry
 - c) Agarose Gel Electrophoresis
 - d) Spectrophotometry
- (vi) Dry Eye Disease in diabetics is often a result of damage to which of the following?
 - a) Retinal microvasculature
 - b) Lens osmotic balance
 - c) Corneal nerves and Goblet cells
 - d) The optic nerve
- (vii) How does chronic hyperglycemia lead to microvascular damage in the retina?

- a) By thinning the basement membrane
 b) Through the damage of pericytes and glycation of proteins
 c) By decreasing free radicals and oxidative stress
 d) By reducing the accumulation of AGEs
- (viii) What is the primary cause of early-onset Snowflake cataracts in young diabetic patients?
- a) Damage to the lacrimal gland
 b) Conversion of glucose to sorbitol leading to lens swelling
 c) Neovascularization of the retina
 d) Damage to the Oculomotor nerve (CN III)
- (ix) A patient presents with a blood sugar reading of 210 mg/dL taken at 3:00 PM along with symptoms of diabetes. How should this result be interpreted?
- a) It is a normal Fasting Blood Sugar (FBS) reading.
 b) It is a normal Postprandial Blood Sugar (PPBS) reading.
 c) An RBS ≥ 200 mg/dL with symptoms suggests diabetes.
 d) It indicates the patient has dry eye disease.
- (x) In the eye, which glucose transporter is primarily expressed in the retina?
- a) GLUT-1
 b) GLUT-2
 c) GLUT-3
 d) GLUT-4
- (xi) How does cortisol affect the eye when levels are chronically high, such as in Cushing's syndrome?
- a) It reduces intraocular pressure.
 b) It causes sudden myopia.
 c) It increases intraocular pressure, potentially leading to steroid-induced glaucoma.
 d) It prevents the formation of cataracts.
- (xii) Which process is defined as the sum of all chemical reactions in the body?
- a) Digestion
 b) Metabolism
 c) Respiration
 d) Glycolysis
- (xiii) Which metabolic pathway is described as a conveyor belt for ATP formation?
- a) Glycolysis
 b) Krebs Cycle
 c) Beta-oxidation
 d) Electron Transport Chain
- (xiv) When a cell converts ATP into ADP + Pi, what is the biological result?
- a) Energy is stored for later use.
 b) Energy is released to perform cellular work.
 c) A protein is built from amino acids.
 d) Glucose is synthesized from CO₂.
- (xv) Tell the name of product produced by the cleavage of Fructose 1, 6-biophosphate is-
- a) Two aldoses
 b) Two ketose
 c) An aldose and a ketose
 d) only kitose

Group-B

(Short Answer Type Questions)

3 x 5=15

2. Explain how insulin deficiency leads to cataract formation (3)
3. List out any three clinical manifestations of Graves' ophthalmopathy. (3)
4. Define metabolism and mention its two types. (3)
5. Explain how an emulsion is stabilized and describe the natural role of emulsions in the human tear film. (3)
6. Evaluate the ocular effects of hemodialysis in patients with chronic kidney disease. (3)

OR

Evaluate the importance of ocular examination in early detection of jaundice. (3)

Group-C

(Long Answer Type Questions)

5 x 6=30

7. Describe the role of gels in biochemistry and ocular applications. (5)
8. Describe the biochemical nature and functions of vitreous humor. (5)

9. Define lipid metabolism and list the types of lipids important for the eye. (5)
10. How does glucose provide energy to the eye and support its functions? (5)
11. Explain why pH is important in eye drops. Why is the pH of some eye drops different from natural tears, and how is this controlled? (5)
12. Compare the importance of HbA1c with Fasting and Post-prandial blood sugar tests in managing diabetes. (5)

OR

Compare how innate and adaptive immunity protect the eye, and name the cells involved in these immune responses. (5)

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