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# MANIPAL ACADEMY OF HIGHER EDUCATION

(Deemed University)

## FIRST YEAR B.Sc. OPTOMETRY DEGREE EXAMINATION – JUNE 2005

### SUBJECT: GENERAL ANATOMY AND OCULAR ANATOMY

Wednesday, June 01, 2005

Time: 1½ Hrs.

Max. Marks: 40

*Answer all questions*

- 1A. Describe the optic nerve under origin, course and termination.
- 1B. Briefly explain the pathway for accommodation reflex.

(5+5 = 10 marks)

2. Write short notes on:

- 2A. Sclera
- 2B. Structure of large vein
- 2C. Testis
- 2D. Cortical areas of cerebrum
- 2E. Synovial joint
- 2F. Lateral wall of the nasal cavity

(5×6 = 30 marks)



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## FIRST YEAR B.Sc. OPTOMETRY DEGREE EXAMINATION – JUNE 2005

### SUBJECT: GENERAL PHYSIOLOGY AND OCULAR PHYSIOLOGY

Thursday, June 02, 2005

Time: 1½ Hrs.

Max. Marks: 40

*Answer all questions*

- 1A. Discuss in detail the formation, circulation and drainage of Aqueous humor. Add a note on the functions of Aqueous humor.
- 1B. With the help of a graph explain "Dark Adaptation". Explain the mechanisms responsible for it with respect to time.
- 1C. Draw a diagram to show the pathway for light reflex. Add a note on Argyll Robertson pupil.

(5×3 = 15 marks)

- 2A. Enumerate any six functions of blood.
- 2B. Define cardiac output. Explain any two factors that regulate cardiac output.
- 2C. Define the following terms:
- i) Alveolar ventilation                      ii) Residual volume                      iii) Vital capacity.
- 2D. Enumerate the functions of stomach.
- 2E. Name the hormones released from Posterior Pituitary. Explain the actions of any one hormone.
- 2F. Explain the role of skin in temperature regulation.
- 2G. Explain briefly the functions of frontal lobe.

(3×7 = 21 marks)

- 3A. Write a note on Saltatory conduction.
- 3B. List the actions of LH in males and females.

(2×2 = 4 marks)



# MANIPAL ACADEMY OF HIGHER EDUCATION

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**FIRST YEAR B.Sc. OPTOMETRY DEGREE EXAMINATION – JUNE 2005**

**SUBJECT: GENERAL BIOCHEMISTRY AND OCULAR BIOCHEMISTRY**

Friday, June 03, 2005

Time: 3 Hrs:

Max. Marks: 80

**Note:**

✗ **ANSWER SECTION 'A' AND SECTION 'B' IN TWO SEPARATE ANSWER BOOKS.**

✗ Draw diagrams wherever necessary

**SECTION – A: GENERAL BIOCHEMISTRY: 40 MARKS**

1. Choose the **SINGLE BEST** response to each of the following:

1A. Bile salts are required for absorption of

- a) Vitamin A                      b) Selenium                      c) Iron                      d) Vitamin B12

1B. All of the following are reducing sugars except

- a) Mannose                      b) Sucrose                      c) Maltose                      d) Lactose

1C. The number of carbon dioxide molecules released during one turn of citric acid cycle is

- a) 1                      b) 2                      c) 3                      d) 4

1D. Normal blood urea level is in the range of

- a) 12-36 gm%                      b) 12-36 mg%                      c) 2-3 mg%                      d) 2-3 gm%

(1×4 = 4 marks)

2. State whether the following statements are **TRUE/FALSE**

2A. The powerhouse of the cell is known as lysosome.

2B. Fluorine prevents dental caries.

2C. In obstructive jaundice excessive amount of urobilinogen is found in urine.

2D. Vitamin D deficiency causes rickets in children.

(1×4 = 4 marks)

3. Fill in the blanks

3A. Electron transport chain is located in \_\_\_\_\_.

3B. Hydroxylation of proline residues of collagen needs \_\_\_\_\_ vitamin.

(1×2 = 2 marks)

4. Answer any **SIX** of the following:

4A. Name the components of

- i) Lecithin      ii) Sphingomyelin      iii) Cerebroside.

4B. Write short note on specialized products of glycine.

4C. Write briefly on buffer system.

4D. Write short note on Rhodopsin cycle.

4E. Discuss the functions of lipoproteins.

4F. Explain the principle of Van den Bergh's test. What is its use?

4G. Briefly describe the blood glucose regulation.

(3×6 = 18 marks)

5. Answer any **TWO** of the following:

5A. Describe  $\beta$ -oxidation of fatty acyl CoA and add a note on its energetics.

5B. Enumerate the reactions of TCA cycle. Add a note on its regulation.

5C. How is calcitriol synthesized in the body? Write note on rickets.

(6×2 = 12 marks)

**SECTION - B : OCULAR BIOCHEMISTRY: 40 MARKS**

6. Write about aqueous humor composition, its production and its function.

(10 marks)

7. Answer any **SIX** of the following:

7A. Write briefly about visual pigments.

7B. Write about physical properties of different contact lens.

7C. Write briefly the biochemical composition of corneal layers.

7D. Write about different diagnostic test regarding normal tear production.

7E. Briefly write about lens transparency.

7F. Write about drainage of aqueous humor.

7G. Write briefly about function of Retinal pigment epithelium.

(5×6 = 30 marks)



**MANIPAL ACADEMY OF HIGHER EDUCATION**

(Deemed University)

**FIRST YEAR B. Sc. OPTOMETRY DEGREE EXAMINATION – JUNE 2005****SUBJECT: PHYSICAL OPTICS**

Monday, June 06, 2005

Time: 3 Hrs.

Max. Marks: 80

1. Explain with reason whether the following statements (ANY TEN) are True or False.
  - 1A. Light is a mechanical wave.
  - 1B. Human eye has an equal response to all types of radiation.
  - 1C. Unit of illuminance is  $\text{Wm}^{-2}$ .
  - 1D. Newtons rings will expand in size when the air film between the lens and the optical flat is replaced by a transparent liquid.
  - 1E. Colours in thin films are due to diffraction.
  - 1F. Dichroism is an optical property of an isotropic crystal.
  - 1G. Rectilinear propagation of light is a limiting case of diffraction phenomenon.
  - 1H. Dispersive power of a grating is higher in higher orders.
  - 1I. Zone plate acts as a Convex lens of multiple foci.
  - 1J. Circular polarization is a special case of elliptical polarization.
  - 1K. Rayleigh scattering occurs when the scattering particles are slightly bigger than the wavelength of the incident light.
  - 1L. Helium atoms give rise to line spectrum.

(2×10 = 20 marks)

**Answer any six full questions of the following.**

- 2A. Explain the terms: i) phase velocity ii) Secondary wavelets.
- 2B. Mention the failures of Huygen's wave theory. Write a note on dual nature of light.
- 2C. A body executing SHM has a frequency of 120 cps and a velocity of  $5\text{ms}^{-1}$  at the mean position. Calculate the total length of the path.

(4+4+2= 10 marks)

- 3A. Explain the terms: i) luminous pointance ii) luminance.
- 3B. With the help of a suitable figure explain luminous efficiency curve.
- 3C. A lamp is placed 10cm away from a mirror inclined at  $45^\circ$  to the line joining the mirror and a screen that are 30cm apart. What is the reflection coefficient of the mirror, if the illuminance on the screen is same as that due to another source of light (identical to the first source) placed 70 cm away from the screen.

(4+4+2 = 10 marks)

- 4A. Explain the terms: i) Superposition of waves ii) antireflection coating.
- 4B. Explain how the radius of curvature of a plano-convex lens is determined in the laboratory by setting up Newton's rings.
- 4C. Two coherent sources emitting light of wavelength 600nm produce a fringe pattern on a screen placed 1m away. If the fringe width is 0.5mm find the distance between the two coherent source.

(2+6+2 = 10 marks)

- 5A. Explain the terms: i) dispersive power ii) resolving power.
- 5B. Obtain the grating equation for a grating placed in minimum deviation position producing a diffraction pattern on a screen.
- 5C. Find the radius of the first half period zone on a zone plate that works like a convex lens of focal length 60cm for a wavelength of 600nm.

(4+4+2 = 10 marks)

- 6A. Explain the terms: i) elliptical polarization ii) optical rotation.
- 6B. Explain how you would determine the specific rotation of sugar in the laboratory using a polarimeter.
- 6C. Plane polarized light of wavelength 500nm incident on a quartz plate emerges as a plane polarized. Calculate the thickness of the plate if  $\mu_c = 1.5533$   $\mu_o = 1.5442$ .

(2+6+2 = 10 marks)

- 7A. Compare a zone plate with a convex lens.
- 7B. Obtain an expression for the fringe width in the interference pattern of a wedge shaped film.
- 7C. A soap film of refractive index  $4/3$  and thickness  $1.5 \times 10^{-4}$ cm is illuminated by white light normally. What is smallest order of the reflection in which 500nm is absent?

(3+5+2 = 10 marks)

- 8A. Write a note on each of the following.
- i) Bunsen flame as a source of light for spectroscopic studies.
- ii) Line emission spectra.
- 8B. Explain the characteristics of Rayleigh scattering.
- 8C. Unpolarised light is incident on a medium causing molecular scattering. If the turbidity at right angles to the incident light is 5 units, what is the turbidity at  $45^\circ$ ?

(4+4+2 = 10 marks)



**MANIPAL ACADEMY OF HIGHER EDUCATION**

(Deemed University)

**FIRST YEAR B.Sc. OPTOMETRY DEGREE EXAMINATION – JUNE 2005****SUBJECT: GEOMETRICAL OPTICS**

Tuesday, June 07, 2005

Time: 3 Hrs.

Max. Marks: 80

1. State whether the following statements are True or False. Briefly explain/justify your answer for any **TEN** of the following:
  - 1A. Vergence is the measure of curvature of a wave-front.
  - 1B. A ray incidenting on the vertex of a spherical surface proceeds without deviation.
  - 1C. When two lenses are in contact the power of the combination is the sum of powers of individual lenses.
  - 1D. In a double convex lens the primary and secondary focal lengths are always equal.
  - 1E. Field stop determines the amount of light reaching any given point in the image.
  - 1F. In chromatic aberration light of different wave lengths will converge at different points.
  - 1G. The condition for ray propagation in an optical fiber is that the incident ray must be within the acceptance case.
  - 1H. The angular magnification is larger if the image is formed at the distance of most distinct vision.
  - 1I. Luminance of a source is same in any direction.
  - 1J. Ruby is a pulsed laser.
  - 1K. Transfer functions are measures of performance.
  - 1L. Spatial filtering facilitates the detection of signal in the presence of unwanted noise.

(2×10 = 20 marks)

2. Answer any **EIGHT** of the following:
  - 2A. Explain total internal reflection. Illustrate how a prism can be used to invert the image of an object.
  - 2B. Explain the terms: i) cardinal points ii) paraxial rays iii) thick lenses.
  - 2C. What are stops distinguish between field and aperture stops.
  - 2D. Explain the terms i) Spontaneous emission ii) stimulated emission  
iii) resonant cavity.
  - 2E. Explain comatic aberration.
  - 2F. What is spatial filtering? Illustrate with an example.
  - 2G. Define the terms i) Radiant flux ii) Luminous intensity iii) Irradiance  
iv) Luminance v) Luminous efficacy.
  - 2H. Explain the construction and working of a spectrometer.

2I. Derive Gaussian formula  $\frac{n}{s} + \frac{n'}{s'} = \frac{n' - n}{r}$  for a spherical surface.

2J. Obtain refraction and transfer equations for a ray refracting through a spherical surface.

(5×8 = 40 marks)

3. Answer any **FIVE** of the following:

3A. A ray of light is incident on a piece of glass at an angle of  $45^\circ$ . If the angle of refraction is  $25^\circ$ , find i) the refractive index ii) the critical angle.

3B. The left end of a long glass rod of index 1.635 is ground and polished to a convex spherical surface of radius 2.5cm. A small object is located in the air and on the axis 9cm from the vertex. Find: i) the primary and secondary focal lengths ii) the power of the surface iii) the image distance.

3C. An equiconcave lens is to be made of flint glass of index 1.75. Calculate the radii of curvature if it is to have a power - 3D.

3D. A glass lens with radii  $r_1 = 2.5$  cm and  $r_2 = 4.5$ cm has a thickness of 2.9cm and an index of 1.63. Calculate: i) the focal length ii) power of the lens. iii) Find the distances from the vertices to the focal points.

3E. A stop 8mm in diameter is placed half way between an extended object and a large diameter lens of 9cm focal length. The lens projects an image of the object onto a screen 14cm away. What is the diameter of the exit pupil?

3F. A hypothetical atom has energy levels evenly spaced by 1.2eV. Calculate the ratio of the number of atoms in the  $13^{\text{th}}$  excited state to that in the  $11^{\text{th}}$  excited state at 2000K.

3G. Calculate the numerical aperture and angle of acceptance for an optical fiber having refractive indices 1.56 and 1.5 for core and cladding respectively.

(4×5 = 20 marks)

