Reg. No.										

MANIPAL ACADEMY OF HIGHER EDUCATION

(Deemed University)

FIRST YEAR B.Sc. OPTOMETRY DEGREE EXAMINATION – MAY/JUNE 2006

SUBJECT: GENERAL ANATOMY AND OCULAR ANATOMY

Wednesday, May 31, 2006

Time: 1½ Hrs. Max. Marks: 40

Answer all questions.

1. Draw a neat labelled diagram of sagittal section of the eyeball. Explain the refractive media of the eye.

(6+4 = 10 marks)

2. Write short notes on:

2A. Testis.

2B. Left lung.

2C. Stomach.

2D. Sclero- corneal junction.

2E. Cerebro- spinal fluid.

2F. Elastic cartilage.

(5×6 = 30 marks)

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MANIPAL ACADEMY OF HIGHER EDUCATION

(Deemed University)

FIRST YEAR B.Sc. OPTOMETRY DEGREE EXAMINATION – MAY/JUNE 2006

SUBJECT: GENERAL PHYSIOLOGY AND OCULAR PHYSIOLOGY

Thursday, June 01, 2006

Time: 1½ Hrs. Max. Marks: 40

Answer all questions.

1A. What is aqueous humor? Explain its functions. Define glaucoma.

(1+3+1 = 5 marks)

1B. What is accommodation reflex? Describe the changes that occur during accommodation.

(1+4 = 5 marks)

1C. Name the receptor for colour vision. What is colour blindness? Write briefly about dark adaptation.

(1+1+3 = 5 marks)

2A. List four factors which influence erythropoiesis. Define anaemia.

(2+1 = 3 marks)

2B. Define the following:

i) cardiac cycle ii) stroke volume iii) blood pressure.

(1×3 = 3 marks)

2C. Name the forms in which O_2 is transported in blood. Give the % of O_2 in atmospheric air.

(3 marks)

2D. List two functions of saliva. Define deglutition.

(2+1 = 3 marks)

2E. Name the hormone whose deficiency leads to cretinism. Mention two actions of ionic calcium.

(1+2 = 3 marks)

2F. Draw a labeled diagram of a nephron.

(3 marks)

2G. Name two ascending tracts, and mention any one sensation carried by each of them.

(3 marks)

3A. Draw a labeled diagram of a reflex arc.

(2 marks)

3B. Mention two factors influencing spermatogenesis. Define ovulation.

(1+1 = 2 marks)

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MANIPAL ACADEMY OF HIGHER EDUCATION

(Deemed University)

FIRST YEAR B.Sc. OPTOMETRY DEGREE EXAMINATION – MAY/JUNE 2006

SUBJECT: GENERAL BIOCHEMISTRY AND OCULAR BIOCHEMISTRY

Friday, June 02, 2006

Time: 3 Hrs. Max. Marks: 80

- **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. DNA has all the following bases EXCEPT

A) Guanine B) Uracil C) Thymine D) Adenine

1B. All the following are renal function tests EXCEPT

A) Creatinine clearance test B) Blood urea estimation

C) Electrolyte measurement D) AST and ALT measurement

1C. Elevation of plasma creatine kinase is seen in

A) Acute pancreatitis B) Prostate cancer

C) Myocardial infarction D) Hemolytic jaundice

1D. Rickets is caused by the deficiency of the vitamin

A) A B) C C) D D) B

(1×4 = 4 marks)

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

2A. The normal renal threshold for glucose is about 180mg %.

2B. Eukaryotic cell does not have a well defined nucleus.

2C. Transferrin is the storage form of iron.

2D. Untreated severe diabetes mellitus can cause ketoacidosis.

(1×4 = 4 marks)

3. Fill in the blanks.

3A. Serotonin is formed from the amino acid _____.

3B. Normal blood urea level is in the range of _____.

(1×2 = 2 marks)

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

4A. Write short note on lactose intolerance.

4B. How is calcitriol formed? What is its role in serum calcium homeostasis?

4C. Write a short note on denaturation of proteins and its consequences.

4D. List the functions of nucleic acids.

4E. List six factors affecting iron absorption.

4F. Write the components of the following:

i) Lecithin ii) Cephalin iii) Lipoprotein

4G. Explain competitive inhibition with two examples. What is its clinical application?

(3×6 = 18 marks)

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

5A. Describe ketone bodies under the following headings:

i) Names ii) Formation iii) Utilization iv) Ketosis

5B. Regarding vitamin A describe

i) Two dietary sources ii) Daily requirement

iii) Role in vision iv) Deficiency manifestation

5C. Write short note on:

i) Galactosemia ii) Structure of t-RNA

(6×2 = 12 marks)

SECTION – B : OCULAR BIOCHEMISTRY: 40 MARKS

6. Describe in details the tear film composition and its function. Write a note on tear substitutes.

(10 marks)

7. Write short notes on any **SIX** of the following:

7A. Discuss the physical properties of different contact lenses.

7B. Describe the mechanism of cataract formation. Write a note on photo-oxidation.

7C. Discuss the relation between aqueous humour (production/outflow) and glaucoma.

7D. Discuss the structure, composition and function of vitreous humor.

7E. Write a note on retinal neurochemistry.

7F. How do antioxidants protect our eyes form age related macular degeneration?

7G. What are the layers of cornea? Discuss the action of corneal endothelium.

(5×6 = 30 marks)

Reg. No.										

MANIPAL ACADEMY OF HIGHER EDUCATION

(Deemed University)

FIRST YEAR B. Sc. OPTOMETRY DEGREE EXAMINATION – MAY/JUNE 2006

SUBJECT: PHYSICAL OPTICS

Saturday, June 03, 2006

Time: 3 Hrs. Max. Marks: 80

Physical constants:

Speed of light (C) = 3×10^{8} m/s.

Electron charge (e) = 1.6×10^{-19}C

Electron mass (m) = 9.11×10^{-31}Kg.

Plank's constant (h) = 6.63×10^{-34} Js

Boltzmann's constant (k) = 1.38×10^{-23} J/K

Permittivity of vaccum (ε_0) = 8.85×10^{-12}F/m

1. Explain with reasons whether the following statements (**ANY TEN**) are true or false.

1A. If a thin transparent sheet is introduced in one arm of the Michelson's interferometer the fringes will disappear from the field of view.

1B. Lloyds single mirror is a device to produce polarized beam by reflection.

1C. The fringes in the double slit interference pattern are of equal width.

1D. Newton's ring of a given order has a longer radius for red light than for blue light.

1E. Rectilinear propagation of light is totally disproved by Fresnel's diffraction.

1F. It is possible to eliminate undesired reflection of light from a lens by coating the lens surface with a transparent film of suitable thickness.

1G. The grating element has no effect on the resolving power of the grating.

1H. Polarization reduces the intensity of the incident light to half its original value.

1I. Illuminance at a point varies directly as the intensity of the source.

1J. Missing orders occur when the slit width is equal to the slit separation.

1K. Sky looks blue due to total internal reflection.

1L. Raman scattering leads to light waves that have wavelengths longer and shorter than the wavelength of the incident light.

(2×10 = 20 marks)

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

2A. Explain coherent sources. Mention the methods of producing coherent sources. Give two examples for each.

2B. Show that the radius of the Newton's dark rings varies directly as the square root of the ring numbers and hence arrive at the practical expression for determining the radius of curvature of a plano-convex lens.

2C. Show that a zone plate acts like a convex lens of multiple foci. Distinguish between a convex lens and zone plate.

2D. Discuss the diffraction phenomenon at a circular aperture qualitatively. Explain its significance.

2E. State Rayleigh's criterion for the resolution two closely spaced lines. Show that the resolving power of a grating is directly proportional to the order of the spectrum.

2F. State the law of Malus. Write a note on polarization by scattering.

2G. Explain briefly how a photometer may be used to compare the luminous intensities of two sources.

2H. Explain Rayleigh scattering as dipole radiation.

(6×6 = 36 marks)

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

3A. The distance between the first and the tenth minima of a double slit pattern is 18mm and the slits are separated by 0.15mm. With the screen 50cm from the slits, when is the wavelength of the light used?

3B. A bi-prism is placed at 5cm from a slit illuminated by light of wavelength 589nm. The fringe width is measured to be 9.424×10^{-2}cm on a screen placed 75cm from the bi-prism. What is the distance between the coherent sources?

3C. Rhinestone (n=1.5) is coated with silicon monoxide (n=2.0) to make it more reflective. How thick should the coating be to achieve strong reflection for 560nm?

3D. When the moveable mirror in Michelson's interferometer is moved through a distance of 0.233mm, 792 fringes are counted. Calculate the wavelength of light.

3E. Interference fringes are produced with monochromatic light falling normally on a wedge shaped film of cellophane whose refractive index is 1.40. The angle of the wedge is 10 seconds of an arc and the distance between the successive fringes is 0.5cm. Calculate the wavelength of the light used.

3F. When monochromatic light is incident on a slit 0.022mm wide, the first diffraction minimum is observed at an angle of 1.8° from the direction of the incident beam. Find the wavelength of the incident light.

3G. What is the minimum thickness of a calcite crystal that will function as a quarter wave plate for a wavelength of 589nm? Given that the refractive indices of the crystal for the ordinary and the extraordinary rays are 1.658 and 1.486 respectively.

3H. A grating has 40,000 rulings spread over a width of 76mm. What is the expected dispersion in °/nm for a wavelength of 589nm in the second order?

(4×6 = 24 marks)

Reg. No.										

MANIPAL ACADEMY OF HIGHER EDUCATION

(Deemed University)

FIRST YEAR B.Sc. OPTOMETRY DEGREE EXAMINATION – MAY/JUNE 2006

SUBJECT: GEOMETRICAL OPTICS

Monday, June 05, 2006

Time: 3 Hrs. Max. Marks: 80

- **Write legibly.**
- **Write the question numbers in the margin.**

Physical constants:

Velocity of light in vacuum=$3\times10^{8}mg^{-1}$

Boltzmann constant = $1.38\times10^{-23}JK^{-1}$

Electron mass =$9.1\times10^{-31}kg$

Electron charge =$1.6\times10^{-19}c$

Planck constant = $6.63\times10^{-34}Js$.

1. State whether the following statements are 'True' or 'Flase', briefly explain/justify your answer for any '**TEN**'

1A. Fermat's principle states that, light in traveling form one point to another takes the shortest path.

1B. Looking from air, underwater objects appear raised.

1C. In case of refraction through a prism the incident and emergent rays are always parallel.

1D. Primary and secondary focal lengths are equal in case a single spherical surface separating two media.

1E. Angular magnification decreases with increase of focal length of the lens.

1F. Effective power of a two lens combination decreases as their separation increases.

1G. Cylindrical lenses have axial astigmatism.

1H. Translation matrix describes the ray propagation from one side of the lens to the other side across it.

1I. A concave lens always produces virtual diminished image.

1J. In thick lenses the distances are measured from the two vertices of the lens.

1K. Population inversion is the necessary and sufficient condition for lasing action.

1L. Stopping potential depends on the intensity of incident light.

(2×10 = 20 marks)

2. Answer any **EIGHT** of the following.

2A. What happens when a beam of light meets a plane surface of a transparent media?

2B. Explain: i) Lateral shift ii) Normal shift

2C. Derive lens maker's formula.

2D. Obtain the refraction matrix for a ray refracting across a spherical surface from refractive index n_1 to n_2.

2E. Write a note on coma.

2F. Trace graphically the entrance and exit pupils of a two lens system with a stop between them. Show the chief ray passing through the system.

2G. Draw a cross sectional view of the human eye and label its parts. Briefly explain the functions of each part.

2H. Write a note on continuous emission spectra.

2I. Explain the terms: i) Spontaneous emission ii) Stimulated emission iii) Induced absorption iv) Pumping.

2J. Explain the phenomenon of photo electric effect.

(5×8 = 40 marks)

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

3A. Two thin prisms have powers of 6.0D each. At what angles should their axes be superimposed to produce a power of 8.0D?

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 9.0cm from the vertex. Find i) the primary and secondary focal lengths. ii) the power of the surface. iii) the image distance and iv) the lateral magnification.

3C. Compute the system matrix for a thick biconvex lens of index 1.5 having radii of 0.5 and 0.25 and a thickness of 0.3 (in any units you like). Check that the determinant of the system matrix is 1.

3D. If peripheral rays are traced through a +5.0D lens of 39mm diameter, it is found that these rays come to a focus 5mm ahead of the paraxial rays. What is the diameter of the blur circle in the paraxial focus?

3E. A thin lens with a focal length of +5cm and an aperture of 6.0cm has a 3.8cm stop located 1.6cm behind it. An object 2.20cm high is located with its lower end on the axis 8cm in front of the lens. Locate using formula i) position and ii) the size of the entrance pupil iii) position of image of the object.

3F. A pulsed laser emits photons of wavelength 780nm with 20mw average power/pulse. Calculate the number of photons contained in each pulse if the pulse duration is 10ns.

3G. An optical fiber has a core material with refractive index 1.55 and its cladding has a refractive index of 1.50. The light is launched into it in air. Calculate its numerical aperture, the acceptance angle and also the fractional index change.

(5×4 = 20 marks)