Reg. No.										

MANIPAL ACADEMY OF HIGHER EDUCATION

(Deemed University)

FIRST YEAR B.Sc. OPTOMETRY DEGREE EXAMINATION – AUGUST 2006

SUBJECT: GENERAL PHYSIOLOGY AND OCULAR PHYSIOLOGY

Monday, August 14, 2006

Time: 1½ Hrs. Max. Marks: 40

Answer all questions.

1A. Schematically represent the rhodopsin – retinal visual cycle. Name the part of retina where cones are present in large number. What is night blindness?

(3+1+1 = 5 marks)

1B. Define and give the correction for:

i) hypermetropia ii) Astigmatism iii) Presbyopia iv) Myopia.

Name the instrument which is used to visualise retinal changes.

(4+1 = 5 marks)

1C. Name the primary colours. What is colour blindness? Define miosis and mydriasis. Give the location of primary visual cortex. How much is the normal intraocular pressure?

(1½+1+1+1+ ½ = 5 marks)

2A. Mention two functions of plasma proteins. Mention one function of RBCs.

(2 +1 = 3 marks)

2B. Mention two factors influencing venous return to the heart. Give the normal value of cardiac output.

(2+1 = 3 marks)

2C. Name the muscles of inspiration. What is the importance of surfactant?

(2+1 = 3 marks)

2D. Mention three functions of liver.

(3 marks)

2E. Give the cause and two features of Cushing's syndrome. Mention one action of glucagon.

(2+1 = 3 marks)

2F. Mention the three processes involved in urine formation. Give the normal value of urine formed per day. Define diuresis.

(1½+ 1+½ = 3 marks)

2G. Mention one function each of:

i) cerebral cortex ii) cerebellum iii) spinal cord.

(1×3 = 3 marks)

3A. Name the receptor for:

i) taste ii) hearing iii) pressure iv) pain.

(2 marks)

3B. Mention two functions each of:

i) testosterone ii) progesterone

(2 marks)

Reg. No.										

MANIPAL ACADEMY OF HIGHER EDUCATION

(Deemed University)

FIRST YEAR B.Sc. OPTOMETRY DEGREE EXAMINATION – AUGUST 2006

SUBJECT: GENERAL BIOCHEMISTRY AND OCULAR BIOCHEMISTRY

Wednesday, August 16, 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. In glycolysis reversible reaction is catalysed by

a) Glucokinase b) Phosphoglycerate kinase

c) Pyruvate kinase d) None of the above

1B. The coenzyme required for propionyl CoA carboxylase is

a) TPP b) NADPH c) Biotin d) PLP

1C. The following bonds are disrupted on denaturation of proteins EXCEPT

a) Peptide bonds b) Hydrogen bonds

c) Hydrophobic forces d) Electrostatic forces

1D. All the following are components of membrane EXCEPT

a) Phospholipids b) Triacyl glycerol

c) Glycolipids d) Glycoproteins

(1×4 = 4 marks)

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

2A. The amino acid containing guanidino group in its side chain is alanine.

2B. S-adenosyl methionine is required for formation of creatinine.

2C. A competitive inhibitor of xanthine oxidase used in the treatment of gout is allopurinol.

2D. Site I of ATP synthesis in the ETC is inhibited by cyanide.

(1×4 = 4 marks)

3. Fill in the blanks:

3A. Example for an amino acid which is both glucogenic and ketogenic is ---------

3B. The major source of ammonia produced by kidneys is --------

(1×2 = 2 marks)

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

4A. What is substrate level phosphorylation? Give two examples with complete reactions.

4B. Give the salient features of α-helix structure in a protein.

4C. Write short note on functions of phospholipids.

4D. Write short note on jaundice.

4E. What is the effect of temperature and pH on the rate of enzyme catalysed reactions.

4F. Write short note on phenyl ketonuria.

4G. Describe the Wald's visual cycle.

(3×6 = 18 marks)

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

5A. Discuss Embden Meyerhof pathway. Add a note on its energetics.

5B. Describe the metabolism of calcium under the following headings

i) Sources and RDA ii) Regulation iii) Deficiency

5C. With help of a neat diagram describe the Watson-Crick model of DNA.

(6×2 = 12 marks)

SECTION – B : OCULAR BIOCHEMISTRY: 40 MARKS

6. Discuss the role of Vitamin A in retinal photochemistry

(10 marks)

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

7A. Describe in brief the metabolism of lens.

7B. Write a note on corneal transparency.

7C. Name the tear film dysfunctions.

7D. What are free radicals? Name few antioxidants and their use in eye.

7E. Write briefly on Hyaluronic acid.

7F. Mention the effects of irrigating solution over the corneal endothelium.

7G. Write a note on soft contact lens.

(5×6 = 30 marks)

Reg. No.										

MANIPAL ACADEMY OF HIGHER EDUCATION

(Deemed University)

FIRST YEAR B. Sc. OPTOMETRY DEGREE EXAMINATION – AUGUST 2006

SUBJECT: PHYSICAL OPTICS

Thursday, August 17, 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 vacuum (ε_0) = 8.85×10^{-12}F/m.

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

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

1B. Lloyd's single mirror experiment provides an evidence for the phase shift due to reflection at a denser surface.

1C. It is possible to enhance the intensity of the light transmitted through a lens by coating lens surface with a transparent film of suitable thickness.

1D. In a Michelson's interferometer, it is possible to set up either circular or straight fringes.

1E. Rectilinear propagation of light is a limiting case of interference.

1F. Diffraction of light occurs when the diffracting object is very large.

1G. As the number of diffracting slits increases, the intensities of the principal maxima decrease.

1H. Polarization reduces the intensity of the incident light.

1I. Human eye is more sensitive to yellow than red light.

1J. Photometry deals with the measurement of electromagnetic radiation.

1K. Red sunsets are a diffraction phenomenon.

1L. Rayleigh scattering is independent of wavelength of light.

(2×10 = 20 marks)

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

2A. Assuming the formula used, briefly describe how the wavelength of a monochromatic source of light is determined using a bi-prism.

2B. Write a note on Lloyd's single mirror. How does its interference pattern differ from the double slit interference pattern?

2C. Obtain an expression for the radius of the n^{th} half period zone and hence show that the area of any half period zone is approximately same.

2D. Discuss the diffraction from a circular aperture qualitatively bringing out its importance.

2E. State Rayleigh's criterion for the resolution of two closely spaced lines. Obtain expressions for the resolving power and the dispersive power of a grating.

2F. Explain: i) double refraction ii) dichroism iii) Brewster's angle iv) Law of Malus

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. With a zone plate for a point source of light on axis, the strongest and the next strongest images are formed at 30 cm and 6 cm respectively from the zone plate. Both the images are on the same side and on the other side of the source. Calculate the distance of the source from the zone plate.

3B. In Newton's ring experiment the diameters of the 5^{th} and the 15^{th} rings are 0.336cm and 0.590 cm respectively. Find the radius of curvature of the plano-convex lens if the wavelength of the light used is 589 nm.

3C. A glass wedge of angle 0.01 radian is illuminated by monochromatic light of wavelength 600 nm normally. At what distance from the edge of the wedge will the tenth fringe be observed in reflected light.

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. Deduce the missing orders for a double slit diffraction pattern if each of the slits is 0.16mm wide and the slit separation is 0.8 mm.

3F. When monochromatic light is incident on a slit 0.022 mm 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 589 nm? Given that the refractive indices of the crystal for the ordinary and the extraordinary rays are 1.658 and 1.486 respectively.

3H. Monochromatic light of wavelength 554 nm illuminates two parallel narrow slits 7.7 μm apart. Calculate the position of the third order principal maximum.

(4×6 = 24 marks)

Reg. No.										

MANIPAL ACADEMY OF HIGHER EDUCATION

(Deemed University)

FIRST YEAR B.Sc. OPTOMETRY DEGREE EXAMINATION – AUGUST 2006

SUBJECT: GEOMETRICAL OPTICS

Friday, August 18, 2006

Time: 3 Hrs. Max. Marks: 80

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

Physical constants:

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

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. Rectilinear propagation is in the domain of physical optics.

1B. Conjugate points are the points on the axis where the magnification is unity.

1C. Looking from air, under wants objects appear raised.

1D. Blue deviates more compared to red light incase of refraction through a prism.

1E. Direct vision prism produces deviation without dispersion.

1F. Light directed along the center of curvature of a spherical surface passes undeviated.

1G. Rays directed towards nodal points suffer maximum deviation.

1H. In an ABCD matrix element A=0 signifies that the output plane coincides with the second focal plane.

1I. Entrance pupil determines the width of the beam that can pass through the system.

1J. Optical fibers work on the principle of total internal reflections.

1K. The angular magnification is larger if the image is formed at the distance of most distinct vision.

1L. Optical pumping is used in the He- Ne laser.

(2×10 = 20 marks)

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

2A. Explain ray tracing technique for refraction through a rectangular glass slab.

2B. Explain the terms: i) Lateral displacement ii) Normal displacement iii) Dispersion.

2C. Write a note on magnification.

2D. Give the experimental details of determining the focal length and radii of curvature of a concave lens.

2E. Outline the steps involved in determining the system matrix for a ray crossing a thick lens. Assuming the appropriate matrices, compute the system matrix.

2F. Write a note on chromatic aberration.

2G. Explain the construction and working of a compound microscope. Obtain an expression for its magnification.

2H. What is photo electric effect. Deduce Einstein's photo electric equation.

2I. Give a brief account of transmission losses in optical fibers.

2J. Give the construction and working of a CO_2 laser.

(5×8 = 40 marks)

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

3A. A 55° prism made of dense flint glass is used at an angle of incidence of 60°. Find the total deviation produced by the prism. Given: Refractive index of the material of the prism is 1.67.

3B. The left end of a long plastic rod of index 1.48 is ground and polished to a spherical surface of radius -2.6cm. An object 2.5cm high is located in the air and on the axis 12cm from the vertex. Find i) Primary and secondary focal lengths ii) the power of the surface iii) the image distance.

3C. Two lenses having focal lengths f_1=+9cm and f_2=-18cm are placed 3cm apart. If an object 2.5cm high is located 20cm in front of the first lens, calculate the position and the size of the final image.

3D. A convex planar lens of index 1.5 has a thickness of 1.2cm and a radius of curvature of 2.5cm. Determine the system matrix when light is incident on the curved surface.

3E. A thin meniscus lens of index 1.60 has radii R_1=+15cm and R2= +30cm. Determine i) Coddington shape factor ii) The position factor for an object 1.0m away.

3F. A convex spherical surface with a radius of +8.0cm is ground and polished on the end of a glass rod. If the rod is in air and the refractive index of glass is 1.62 calculate the i) longitudinal spherical aberration and ii) the lateral spherical aberration. Assume the height of the incident ray to be 6.0cm.

3G. A He – Ne laser emits light at a wavelength of 632.8nm and has an output power of 2.3mw. How many photons are emitted each minute by this laser when operating?

(4×5 = 20 marks)