Reg. No.										

MANIPAL UNIVERSITY

FIRST YEAR B.Sc. OPTOMETRY DEGREE EXAMINATION – JUNE 2008

SUBJECT: GENERAL ANATOMY AND OCULAR ANATOMY

Monday, June 09, 2008

Time: 3 Hrs. Max. Marks: 80

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1. Describe the Visual pathway in detail. Mention the effects of lesions at different levels.

(8+4 = 12 marks)

2. Write short notes on:

2A. Intrinsic muscles of larynx

2B. Para nasal air sinuses

2C. Sensory nerve supply of tongue

(6×3 = 18 marks)

3. Write notes on:

3A. Coronary sinus

3B. Parietal pleura

3C. Intercostal nerve

(5×3 = 15 marks)

4. Write briefly on:

4A. Abducent nerve

4B. Blood supply of retina

4C. Ciliary ganglion

4D. Blood supply of supra renal gland

4E. Superior vena cava

(4×5 = 20 marks)

5. Write briefly on:

5A. Vermiform appendix

5B. Parts and position of uterus

5C. Features of large intestine

5D. Multipolar neuron

5E. Superior mesenteric artery.

(3×5 = 15 marks)

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MANIPAL UNIVERSITY

FIRST YEAR B.Sc. OPTOMETRY DEGREE EXAMINATION – JUNE 2008

SUBJECT: GENERAL PHYSIOLOGY AND OCULAR PHYSIOLOGY

Tuesday, June 10, 2008

Time available: 3 Hours. Max. Marks: 80

1. Essay:

1A. Describe the origin and conduction of impulse in the human heart. Relate these events to waves of ECG.

1B. Draw labeled diagram showing the origin, course and termination of the corticospinal pathway. Mention three characteristic features of damage to this pathway.

(10+(7+3) = 20 marks)

2. Write short notes on the following:

2A. Cerebrospinal fluid.

2B. Neuromuscular junction.

2C. Functions of skin.

2D. Carbon dioxide transport in blood.

2E. Types of transport mechanisms across cell membrane.

2F. Composition of blood.

2G. Salivary secretion-composition and regulation.

2H. Ovarian hormones.

(5×8 = 40 marks)

3. Write brief answers to the following:

3A. List any four functions kidney.

3B. Define ovulation. Mention two methods to detect the time of ovulation.

3C. Name four hormones that increase plasma glucose level.

3D. List two adverse effects of mismatched blood transfusion.

3E. Define sensory receptor. List two properties of sensory receptor.

3F. What is hemophilia?

3G. List two functions of middle ear.

3H. Draw a diagram of the motor unit.

3I. Mention two causes of tachycardia.

3J. Define the following:

i) Hypoxia ii) Apnea

(2×10 = 20 marks)

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FIRST YEAR B.Sc. OPTOMETRY DEGREE EXAMINATION – JUNE 2008

SUBJECT: GENERAL BIOCHEMISTRY AND OCULAR BIOCHEMISTRY

Wednesday, June 11, 2008

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

- **Answer ALL questions.**

1. Classify polysaccharides. Give TWO examples for each with their functions.

(4 marks)

2. Write the reactions of the citric acid cycle. Add a note on its energetics.

(8 marks)

3. Mention TWO physiologically important compounds each derived from glycine, tyrosine, histidine and tryptophan.

(4 marks)

4. Give the RDA, sources, biochemical functions and disorders for Vitamin A.

(6 marks)

5. Give the normal serum level and TWO conditions in which they are altered for glucose and protein.

(3 marks)

6. Write the reactions involved in the oxidation of palmitic acid.

(6 marks)

7. What is the diagnostic importance of serum creatine kinase and alanine transaminase?

(3 marks)

8. What is biological value of a protein? Mention protein sources with high biological value.

(2 marks)

9. Mention the causes for lactose intolerance. Describe the clinical features and biochemical changes occurring after the intake of milk in these patients.

(4 marks)

SECTION – B : OCULAR BIOCHEMISTRY: 40 MARKS

10. Discuss the factors responsible for maintaining the transparency of cornea.

(10 marks)

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

11A. Advantages and disadvantages of soft contact lenses.

11B. Sugar Cataract.

11C. Photoreceptor cell structure with diagram.

11D. Write about normal biochemical composition of aqueous humor.

11E. Write about tear substitute and recent developments.

11F. Vit A. and its uses in eye.

11G. Write about different free radicals produce in eyed tissue.

(5×6 = 30 marks)

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MANIPAL UNIVERSITY

FIRST YEAR B. Sc. OPTOMETRY DEGREE EXAMINATION – JUNE 2008

SUBJECT: PHYSICAL OPTICS

Thursday, June 12, 2008

Time: 3 Hrs. Max. Marks: 80

1. State whether the following statements are **TRUE** or **FALSE** and justify your answer. Answer any **TEN** only.

1A. The frequency of a SHM is 100 Hz. Its time period is 100 second.

1B. When a light wave is reflected from the surface of an optically denser medium, it undergoes a phase change of 90°.

1C. A physics instructor slips a thin sheet of a transparent material with an index of refraction only slightly larger than air over both the slits in a double slit demonstration experiment. As a consequence of this the fringes will move slightly close together.

1D. A laser in a compact disc player generates light that has a wavelength of 780 nm in air, then the wavelength of this light in the plastic(n = 1.55) is 1209 nm.

1E. Circular fringes formed in a Michelson interferometer can be considered as rings of constant thickness.

1F. In a thin air film eight fringes occur between two points when light is incident normally on the film. If the wavelength of light is 500 nm, the difference in thickness of the film between the two points considered is 2 μm.

1G. Raman Effect is the inelastic scattering of a photon.

1H. Diffraction effects are a consequence of the particle nature of light.

1I. Intensity of the central maximum in a single slit diffraction experiment is proportional to the square of the width of the slit.

1J. A diffraction grating produces more number of spectra if it has less number of slits per unit length.

1K. An ideal polarizing sheet transmits 90% of the partially polarized light. Then the percentage of incident light polarized light lies between 80% and 90%.

1L. The amplitude of the randomly polarized light incident on the polarizer is "a". Then the amplitude of the polarized light transmitted through it is $\mathbf{a/\sqrt{2}}$

(2×10 = 20 marks)

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

2A. Define the following terms in photometry with units i) Luminance ii) Illuminance and iii) Luminous intensity.

2B. Show analytically that the colors observed by reflection and refraction through a thin film are complementary to each other.

2C. Explain the construction and working of a Lloyd's mirror experiment. How the experiment accounts for the reflection phase shift?

2D. Derive an expression for the intensity distribution due to Fraunhoffer diffraction at multiple slits. Deduce the conditions for maxima and minima.

2E. Derive the general equation of polarization ellipse. Derive the conditions for linear and circular polarization states.

2F. Explain Rayleigh's criterion for optical resolution. Derive an expression for the resolving power of a plane transmission grating.

2G. i) Discuss the spectral response of a standard Human eye for photopic vision.

ii) Mention any two applications of polarization of light.

2H. Mention two differences between the following:

i) Prism spectra and Grating spectra. ii) Convex lens and Zone plate.

iii) Fraunhoffer and Fresnel diffraction

(6×6 = 36 marks)

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

3A. In an interference experiment in a large ripple tank, the coherent vibrating sources are placed 120.0 mm apart. The distance between maxima 2.0 m away is 180.0 mm. If the speed of ripples is 25.0 cm/s, calculate the frequency of the vibrating sources.

3B. In a Newton's rings experiment, the radius of curvature of the lens is 5.0 m and its diameter is 20.0 mm i) How many bright rings are seen in reflected light? ii) How many bright rings would be seen if the arrangement were immersed in water of refractive index 1.33?

3C. In a biprism experiment, the spacing of 20 dark bands was 4 mm. The distance of the eye-piece from the slit was 100 cm. When a lens was mounted on the axis at a distance of 20 cm from the slit, a well defined image was seen in the eye-piece and the distance between the virtual sources was 1.18 cm. Calculate the wavelength of light used.

3D. Calculate the minimum thickness of a quarter wave plate for light of wavelength 589.6 nm. The refractive indices for ordinary and extraordinary rays are 1.54 and 1.56 respectively.

3E. The innermost zone of a zone plate has a diameter of 0.425 mm i) Find the focal length of the plate when it is used with parallel incident light of wavelength 447 nm from a helium lamp ii) Find its first subsidiary focal length.

3F. A grating has 350 rulings/mm and is illuminated at normal incidence by white light. A spectrum is formed on a screen 30 cm from the grating. If a 10.0 mm square hole is cut in the screen with its inner edge 50.0 mm from the central maximum and parallel to it, what range of wavelengths passes through the hole?

3G. A crystal is placed in a polariscope, the polarizer and analyzer being parallel. The principal section of the crystal makes an angle of 35° with the planes of transmission of the polarizer and analyzer. Find the ratio of the intensities of the E and O beams as they leave the crystal.

3H. An astronaut in a satellite claims to be just barely resolving two point sources on earth 163 km below. Calculate the i) angular and ii) linear separation of the two point sources assuming ideal conditions. Take λ = 540 nm and the pupil diameter of the astronaut's eye to be 4.90 mm.

(4×6 = 24 marks)

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MANIPAL UNIVERSITY

FIRST YEAR B.Sc. OPTOMETRY DEGREE EXAMINATION – JUNE 2008

SUBJECT: GEOMETRICAL OPTICS

Friday, June 13, 2008

Time: 3 Hrs. Max. Marks: 80

- **Answer any TEN questions from Part A, EIGHT from Part B & any FIVE from Part C.**
- **Write question numbers clearly on the left margin.**

Physical Constants:

Speed of light in vacuum	$= 3.00 \times 10^{8}$ m/s	Electron charge	$= 1.60 \times 10^{-19}$ C
Electron mass	$= 9.11 \times 10^{-31}$ kg	Boltzmann constant	$= 1.38 \times 10^{-23}$ J/ K
Planck's constant	$= 6.63 \times 10^{-34}$ J.s	1°C = 273 K	

Any missing data may suitably be assumed.

PART – A

1. State whether the following statements are TRUE or FALSE. Briefly explain/ justify your answer.

1A. Light incident at an angle of θ on a plane mirror gets reflected. The angle of deviation of the ray is equal to 180 – 2θ.

1B. Cauchy's equation represents normal dispersion of light in a medium.

1C. In an optic fiber, refractive index of the core should be less than that of the cladding.

1D. Image formed by a concave mirror is always real.

1E. Dispersive power of a prism for the two given colors depends on the angle of the prism.

1F. Primary and secondary focal lengths are equal for a thin lens.

1G. In an ABCD system matrix, D = 0 means, the input plane functions as the first focal plane.

1H. The principal planes of a thick lens are two planes having unit positive lateral magnification.

1I. Very low current densities are maintained in an Ar+ laser discharge tube.

1J. Numerical aperture of an optic fiber is a measure its light gathering capacity.

1K. Spherical aberration is produced due to the different focal lengths various colors have in the composite light.

1L. A chief ray is the one which always passes through the center of the lens.

(2×10 = 20 marks)

PART – B

2A. Show that laws of reflection follow Fermat's principle.

2B. Describe how two prisms can be combined to produce dispersion without deviation. Obtain the condition to be satisfied for the same.

2C. Deduce the Gaussian formula for refraction of light at a single spherical surface. Mention the sign conventions adopted.

2D. Illustrate the oblique -ray method for graphically locating the final image formed by two thin lenses separated by a small distance.

2E. Explain the longitudinal and lateral spherical aberrations occurring in a thin –lens. How these aberrations can be minimized.

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

2G. With the help of suitable energy level diagrams, explain the working of a CO_2 laser. Mention two differences between CO_2 laser and He- Ne laser.

2H. Assuming the refraction matrices for refraction at individual spherical surfaces, deduce the thin -lens ray- transfer matrix.

2I. Define the magnifying power of a telescope and deduce an expression for the same.

2J. What is photo electric effect? Write Einstein's explanation for the same.

(5×8 = 40 marks)

PART – C

3A. A ray of light is incident on a glass slab 0.011 m thick and refractive index 1.532 at 45°. Calculate the lateral shift.

3B. Calculate the angular dispersion produced by a prism of angle 4°. Given n_v = 1.650 and n_r = 1.550. Calculate also the deviation of the violet ray and the dispersive power of the prism for violet and red wavelengths.

3C. A glass sphere of refractive index 1.5 has a diameter of 0.20 m. A parallel beam is incident on the sphere. Where is it brought to focus by the sphere?

3D. What is the nature and power of the lens to be placed in contact with a concave lens of focal length 0.20 m to form a convergent combination of power +5 D.

3E. Compute the system matrix for a thick biconvex lens with radii of 2.50 cm and 4.50 cm having a thickness of 2.90 cm and an index of 1.630.

3F. An optical fiber has a core material of refractive index 1.55. If the acceptance angle of the fiber is 25°, calculate its numerical aperture. Also calculate the refractive index of the cladding material.

3G. A pulsed laser emits photons of wavelength 532.0 nm with 440.0 mJ of energy per pulse. Calculate the average power and the number of photons emitted per pulse if the pulse duration is 5.0 ns.

(4×5 = 20 marks)