Reg. No.										

MANIPAL UNIVERSITY

FIRST YEAR B.Sc. OPTOMETRY DEGREE EXAMINATION – JUNE 2010

SUBJECT: GENERAL ANATOMY AND OCULAR ANATOMY

Monday, June 07, 2010

Time: 10.00-13.00 Hrs. Max. Marks: 80

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1. Describe the extra-ocular muscles with their attachments, nerve supply and actions.

(6+2+4 = 12 marks)

2A. Duodenum
2B. Retina
2C. Uterus

(6×3 = 18 marks)

3A. Right atrium
3B. Neuron
3C. Ophthalmic artery

(5×3 = 15 marks)

4A. Stratified epithelium
4B. Parotid gland
4C. Trachea
4D. Circle of Willis
4E. Portal vein

(4×5 = 20 marks)

5A. Gall bladder
5B. Appendix
5C. Hyaline cartilage
5D. Ovary
5E. Skeletal muscle.

(3×5 = 15 marks)

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MANIPAL UNIVERSITY

FIRST YEAR B.Sc. OPTOMETRY DEGREE EXAMINATION – JUNE 2010

SUBJECT: GENERAL PHYSIOLOGY AND OCULAR PHYSIOLOGY

Wednesday, June 09, 2010

Time: 10.00-13.00 Hours. Max. Marks: 80

✍ **Answer all questions.**

1. Draw a labelled diagram of neuromuscular junction. Write the sequence of events of neuromuscular transmission.

(10 marks)

2. Describe the actions of thyroid hormones. Add a note on Cretinism.

(10 marks)

3. Write short notes on the following:

3A. Facilitated diffusion.

3B. ABO system of blood grouping.

3C. Stages of deglutition.

3D. Functions of cerebrospinal fluid.

3E. Baroreceptor role in regulation of blood pressure.

3F. Oxygen transport.

3G. Functions of kidney.

3H. Functions of placenta.

($5\times8 = 40$ marks)

4. Write brief answers to the following questions:

4A. List the functions of rods and cones.

4B. Give the cause for each of the following conditions:

i) Cushing's syndrome ii) Diabetes mellitus

4C. Mention two actions of estrogen.

4D. What is neutrophilia? Give one condition for it.

4E. Mention any two sensations carried by the dorsal column tract.

4F. Define hypoxia. Give one cause for it.

4G. Define blood pressure. Give its normal value.

4H. Enumerate the functions of liver.

4I. Define glomerular filtration rate. Give its normal value.

4J. Name the muscle proteins that have a role in contraction.

($2\times10 = 20$ marks)

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MANIPAL UNIVERSITY

FIRST YEAR B.Sc. OPTOMETRY DEGREE EXAMINATION – JUNE 2010

SUBJECT: GENERAL BIOCHEMISTRY AND OCULAR BIOCHEMISTRY

Friday, June 11, 2010

Time: 10.00-13.00 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. With the help of graphs, explain the effect of competitive and non competitive inhibitors on enzyme activity.

(4 marks)

2. Classify lipids giving one example for each class.

(3 marks)

3. Tabulate THREE similarities and THREE differences between starch and glycogen.

(3 marks)

4. With the help of schematic diagram, explain the biochemical changes taking place in a patient with lactose intolerance after the intake of milk.

(4 marks)

5. Explain with reactions, the process of glycolysis.

(7 marks)

6. Write short notes on the importance of dietary fibers.

(3 marks)

7. Explain the process of protein digestion in the stomach.

(3 marks)

8. List four similarities and four differences between marasmus and kwashiorkor.

(4 marks)

9. Write the reactions of the urea cycle.

(5 marks)

10. Describe the Watson and Crick model of DNA.

(4 marks)

SECTION – B : OCULAR BIOCHEMISTRY: 40 MARKS

11. Describe endothelial pump mechanism. Add a note on aging changes in cornea.

(10 marks)

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

12A. Write briefly on age related retinal diseases.

12B. Write short note on retinal neurochemistry.

12C. Describe in short the structure and composition of vitreous humor.

12D. Describe the structure of ciliary body, aqueous humor production and drainage.

12E. Discuss glucose utilization in lens with a note on Sorbitol pathway.

12F. Tear substitutes.

12G. Write a short note on intraocular gels with a note on recent developments.

($5\times6 = 30$ marks)

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MANIPAL UNIVERSITY

FIRST YEAR B. Sc. OPTOMETRY DEGREE EXAMINATION – JUNE 2010

SUBJECT: PHYSICAL OPTICS

Monday, June 14, 2010

Time: 10.00-13-00 Hrs. Max. Marks: 80

1. State whether the following statements are TRUE or FALSE and justify your answer. Answer any <u>TEN</u> only

1A. The phase difference between electric and magnetic field vectors in the electromagnetic waves is $\pi/4$.

1B. In a Young's double-slit experiment, the slit separation is doubled. This results in a halving of the fringe spacing.

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

1D. In the case of simple harmonic motion (slow motion oscillation of simple pendulum for example) the potential energy is zero at the maximum displacement position.

1E. If interference is to occur for light passing though a single slit, the width of the slit must be comparable to the wavelength of light.

1F. Dispersive power of a grating is higher in lower orders.

1G. A light spectrum is formed on a screen using a diffraction grating. The entire apparatus (source, grating and screen) is now immersed in a liquid of refractive index 1.33. As a result, the pattern on the screen crowds together.

1H. To reduce diffraction effects in microscopes and to increase their resolving power light of shorter wavelength is used.

1I. When light waves diffract around a disk, creates bright spot in the shadow.

1J. Quarter wave plate introduces a path difference of $\lambda/2$ between O-ray and E-ray.

1K. A vertical automobile radio antenna is sensitive to electric fields that are polarized vertically.

1L. Raman scattering is an inelastic scattering.

(2×10 = 20 marks)

2. Answer any SIX of the following:

2A. Write short notes on:

i) Huygens wave theory ii) Newton's corpuscular theory.

2B. Discuss the formation of circular fringes in Michelson's interferometer.

2C. Show that the interference in thin films observed in reflected and transmitted lights are complementary to each other.

2D. Show that zone plate acts like a convex lens of multiple foci.

2E. Discuss the Fraunhoffer diffraction due to a single slit. Derive the expression for the intensity distribution of a monochromatic light beam diffracted from a single slit.

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

2G. Discuss the spectral response of a standard Human eye for photopic and scotopic vision.

2H. Explain briefly Rayleigh's scattering of light.

(6×6 = 36 marks)

3. Answer any SIX of the following.

3A. In a double slit experiment performed with blue green light of wavelength 512 nm, the slits are 1.2 mm apart and the screen is 5.4 m from the slits. How far apart are the bright fringes as seen on the screen.

3B. In a Lloyd's single mirror experiment, the distance between the slit source and its image is 5mm. The screen is at a distance of 1m from the source. The fringe width is observed to be 0.1092mm. Calculate the wavelength of light used.

3C. An air wedge formed by an insulated copper wire with glass plate of length 10 cm. The system is illuminated normally by light of wavelength 600 nm. 20 fringes are obtained per centimeter. After removing the insulation the fringes are obtained again. The number of fringes decreased by 5/cm. Calculate the thickness of the insulation.

3D. A given point is vibrating with SHM with a period of 5.0 s and amplitude of 3.0 cm. If the initial phase angle is $\pi/3$ rad, (60°). Find the displacement after 12.0 s.

3E. Light of wavelength 633 nm is incident on a narrow slit. The angle between the 1^{st} minimum on one side of the central maximum and the 1^{st} minimum on the other side is 1.97°. Find the width of the slit.

3F. The D line in the spectrum of sodium is a doublet with wavelengths 589.0 and 589.6 nm. Calculate the minimum number of lines needed in a grating that will resolve this doublet in the second-order spectrum.

3G. A ray of light is incident on the surface of a glass plate of refractive index 1.25 at the polarizing angle. Calculate the angle of refraction.

3H. A small source of 100 candle-power is suspended 6m vertically above a point P on a horizontal surface. Calculate the illumination at a point Q on the surface 8m from P and also at P.

(4×6 = 24 marks)

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MANIPAL UNIVERSITY

FIRST YEAR B.Sc. OPTOMETRY DEGREE EXAMINATION – JUNE 2010

SUBJECT: GEOMETRICAL OPTICS

Wednesday, June 16, 2010

Time: 10.00-13.00 Hrs. Max. Marks: 80

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

PART – A

1. **State whether the following statements are True (T) or False (F). Justify your answer briefly.**

1A. Complete elimination of spherical aberration is possible by using a graded-index lens.

1B. A camera lens of 50mm focal length with an aperture 12.5mm in diameter has f-number $625mm^2$.

1C. In a camera, smaller the field stop, smaller is the field of view.

1D. The exit vergence of a positive refracting surface of power +6dioptres is +4 dioptres if the entrance vergence is -2 dioptres.

1E. If the optical path length between two points in a medium of refractive index 1.6 is 16 cms., then the actual distance between the points is 25.6cm.

1F. In an ABCD system matrix, when B=0 all rays from a point in the object input plane arrive at the same point in the output plane.

1G. Stopping potential depends upon the intensity of the incident light.

1H. The minimum length of a mirror that is needed for a person of height H to see his entire reflection is (H/2).

1I. When a plane mirror is rotated by an angle, the reflected ray is turned by twice the angle.

1J. Numerical aperture of an optical fiber depends on the refractive index of the surrounding medium.

1K. The focal length of the combination of two lenses of focal lengths 'f' and '3f' separated by a distance 'f' is 'f'.

1L. Both objective and eye-piece of a compound microscope have as small focal lengths as possible.

(2×10 = 20 marks)

PART – B

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

2A. Using Fermat's principle, derive the laws of reflection and refraction of light on the plane interface between two media.

2B. Derive Gaussian formula for refraction of light at a spherical surface

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. Derive the condition for the combination of two thin prisms to produce mean deviation without net dispersion.

2F. Obtain an expression for the equivalent focal length two convex lenses kept out of contact.

2G. Explain Transverse Magnification. Obtain 'Smith-Helmholtz relationship' What is 'Optical invariant'?

2H. Describe with the help of a neat ray diagram the working of a Terrestrial Telescope. Obtain an expression for its magnifying power.

2I. Set up equations for absorption and emission of radiation for an assembly of atoms interacting with radiation under equilibrium and deduce an expression for radiant energy density in terms of Einstein's coefficients.

2J. What is Numerical Aperture? Obtain an expression for it in terms of R.I of core and cladding of the fiber and arrive at the condition for ray propagation.

(5×8 = 40 marks)

PART – C

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

3A. A light beam falls upon a plane-parallel glass plate, t = 6.0cm in thickness. The angle of incidence is 60°. Find the value of the deflection of the beam which passed through that plate.

3B. Compute the system matrix for a thick biconvex lens of refractive index 1.63 with radii of curvature 2.50cm and 4.50cm having thickness 3.0cm.

3C. A lens has a power of +5 diopters in air. What will be its power if completely immersed in water? (R.I water = 4/3., R.I of glass = 3/2)

3D. A ruby laser emits light at 694.4nm. If a laser pulse is emitted for 12.0 ps and energy release per pulse is 150nJ. (a) What is the length of the pulse? (b) Calculate the production rate of photons.

3E. There is a small air bubble inside a glass sphere (R.I =3/2) of radius 10cm. The bubble is 4.0cm below the surface and when viewed normally from the outside. Find the apparent depth of the bubble.

3F. In a photoelectric experiment using a sodium surface, you find a stopping potential of 1.85V for a wavelength of 300 nm and a stopping potential of 0.820V for a wavelength of 400 nm. From these data find (a) a value for the Planck's constant (b) the work function for sodium and (c) cut off wavelength for sodium.

(4×5 = 20 marks)