Reg. No.										

MANIPAL UNIVERSITY

FIRST YEAR B.Sc. OPTOMETRY DEGREE EXAMINATION – MAY 2009

SUBJECT: GENERAL ANATOMY AND OCULAR ANATOMY

Monday, May 18, 2009

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

1. Name the extra ocular muscles. Discuss their attachments, nerve supply and actions.

(2+6+2+2 = 12 marks)

2. Write short notes on:

2A. Portal vein

2B. Synovial joints

2C. Nasal septum

(6×3 = 18 marks)

3. Write notes on:

3A. Right coronary artery

3B. Hilum of lung

3C. Openings of diaphragm

(5×3 = 15 marks)

4. Write briefly on:

4A. Intra ocular muscles

4B. Visual area

4C. Cornea

4D. Blood supply of thyroid gland

4E. Arch of aorta

(4×5 = 20 marks)

5. Write briefly on:

5A. Spermatic cord

5B. Simple epithelium

5C. Differences between small and large intestine

5D. Uterine tube

5E. Hilum of Kidney.

(3×5 = 15 marks)

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MANIPAL UNIVERSITY

FIRST YEAR B.Sc. OPTOMETRY DEGREE EXAMINATION – MAY 2009

SUBJECT: GENERAL PHYSIOLOGY AND OCULAR PHYSIOLOGY

Tuesday, May 19, 2009

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

1. Explain the functions of different areas of cerebral cortex.

(10 marks)

2. Describe mechanism of breathing.

(10 marks)

3. Write briefly on the following:

3A. Enumerate any four properties of cardiac muscle. Explain briefly any two of them.

3B. Define venous return. Name any four factors influencing venous return. Explain how venous return affects cardiac output.

3C. Draw and label the diagram of the cross section of the human eye. Mention the functions of any two structures.

3D. Explain the actions of thyroid hormones on growth and development.

3E. Mention the function of T-tubules and terminal cisternae of sarcotubular system. What are the sources of energy for muscular contraction?

3F. Describe the structure and functions of the respiratory membrane.

3G. Describe the functions of basal ganglia. Mention the clinical features of a disease due to a lesion in it.

3H. Draw and label the normal electrocardiogram. Write a note on P-R interval.

(5×8 = 40 marks)

4. Write short answer to each of the following:

4A. Mention two actions of estrogen.

4B. Define deglutition. Mention the stages of deglutition.

4C. What is hemophilia? What is its cause?

4D. How much is the normal body temperature? Name ONE change in the body when exposed to cold.

4E. Mention the effects of sectioning of a motor nerve.

4F. List the functions of placenta.

4G. List the hormones which increase blood glucose level.

4H. Name the lymphatic organs in the body. Mention the function of one of them.

4I. What is meant by oxygen carrying capacity of blood? Give its normal value.

4J. Mention the functions of saliva.

(2×10 = 20 marks)

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MANIPAL UNIVERSITY

FIRST YEAR B. Sc. OPTOMETRY DEGREE EXAMINATION – MAY 2009

SUBJECT: PHYSICAL OPTICS

Thursday, May 21, 2009

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

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

1A. A progressive wave of frequency 500 Hz is traveling with a speed of 360 m/s. The distance between two points which are having a phase difference of 60° is 0.12 m.

1B. A particle starts its SHM from the mean position at t = 0. Time period is T. It will be at the extreme position after a time t = T/2.

1C. Two closely located, monochromatic light sources create a fixed interference pattern on a screen. If the frequency of one of the sources is increased, the fringes will shift left or right but the spacing will remain constant.

1D. One microscope slide is placed on top of another with their left edges in contact and a human hair under the right edge of the upper slide. As a result a wedge of air exists between the slides. An interference pattern results when monochromatic light is incident on the wedge. At the left edges of the slides there is a dark fringe.

1E. In a Newton's rings experiment, the radius of the twenty fifth dark ring decreases when sodium yellow light is replaced by blue monochromatic light.

1F. Left circularly polarized light is reflected from a plane mirror. The polarized state of the reflected ray depends on the angle of incidence.

1G. Two nicol prisms are inclined to each other at 30°. If I be the intensity of the light incident on the prism, then the intensity of the light emerging from the second prism is (3/8) I.

1H. A vertically oriented, ideal polarizing sheet transmits 50% of the incident unpolarized light. The polarizing sheet is now rotated through 45°. Then the fraction of the incident intensity that passes through is 100%.

1I. In Raman scattering the energy of the photon can decrease.

1J. Dispersive power of a plane transmission grating decreases with the increase in the order of the spectrum.

1K. Replacing a blue filter in place of a red filter in a telescope maximizes the resolution of a Binary star.

1L. Penetration of light in to geometrical shadow region of the object is called refraction of light.

(2×10 = 20 marks)

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

2A. Explain briefly about the dual nature of light.

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

2C. Explain how Fresnel divided the incident plane wave front into a number of half period zones. Show that all the half period zones are of equal area and their radii are proportional to square root of the natural numbers.

2D. Explain qualitatively the phenomena of Fraunhoffer diffraction at a single slit. Sketch the intensity distribution graph.

2E. Explain how circularly and elliptically polarized light are produced and detected.

2F. What is optical activity? Explain the construction and working of a Laurent's half shade polarimeter.

2G. Mention two applications each of i) Interference of light ii) Diffraction of light and iii) Polarization of light.

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

ii) Mention any two applications of Raman scattering.

(6×6 = 36 marks)

3. Answer any SIX of the following:

3A. In Young's experiment the fringe width obtained is 0.60 cm by using light of wavelength 500.0 nm. If the distance between the screen and slit is reduced to half, what should be the wavelength of light source to get fringes 0.40 cm wide.

3B. When a thin film of glass of refractive index 1.5 is interposed in the path of one of the interfering beams of the Michelson interferometer, a shift of 30 fringes of sodium light is observed across the field of view, if the thickness of the film is 0.18 mm, Calculate the wavelength of light used.

3C. Given the diameters of the successive bright rings in Newton's rings experiment (reflected system) using light of wavelength 589.0 nm are 2.00 cm and 2.02 cm. calculate the radius of curvature of the convex lens.

3D. A diffraction grating has 200 rulings per mm and a principal maximum is noted at $\theta = 28^{\circ}$. What are the possible wavelengths of the visible light?

3E. A converging lens 32.0 mm in diameter has a focal length of 24.0 cm.

i) What angular separation must two distant point objects have to satisfy Rayleigh's criterion?

ii) How far apart are the centers of diffraction patterns in the focal plane of the lens? Given: $\lambda = 500.0$ nm.

3F. Intensity of light through a polarizer and analyzer is maximum when their principal planes are parallel. Through what angle the analyzing nicol must be rotated so that the intensity gets reduced to ¼ th of the maximum value.

3G. A beam of linearly polarized light is changed in to circularly polarized light by passing it through a sliced crystal of thickness 0.003 cm. calculate the difference in refractive indicies of the two rays in the crystal assuming this to be of minimum thickness that will produce the effect. Wavelength of light used is 600.0 nm.

3H. The diameter of the central zone of a zone plate is 2.3 mm. If a point source of light of wavelength 589.3 nm is placed at a distance of 6.0 m from it, calculate the position of the first image.

(4×6 = 24 marks)

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MANIPAL UNIVERSITY

FIRST YEAR B.Sc. OPTOMETRY DEGREE EXAMINATION – MAY 2009

SUBJECT: GEOMETRICAL OPTICS

Friday, May 22, 2009

Time: 10.00-13.00 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.**
- **Any missing data may suitably be assumed.**

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	

PART – A

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

1A. Absolute refractive index of a medium is always greater than one.

1B. When an object in a rarer medium is viewed normally from a denser medium, object appears to be shifted farther away.

1C. A ray of monochromatic light of wavelength 600 nm in air enters water of refractive index 4/3. Wavelength of light in water will be 450 nm.

1D. Critical angle of a medium depends on the wavelength of light.

1E. Total deviation produced in a prism due to refraction does not depend on the refracting angle of the prism.

1F. Focal length of a convex lens increases compared to that in air when immersed in a liquid of refractive index less than that of the refractive index of the material of the lens.

1G. In an ABCD system matrix, C = 0 means, input parallel rays produce parallel output rays.

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

1I. Optical pumping is provided in a CO_2 laser.

1J. Angular magnification increases with increase in focal length of the lens.

1K. Spherical aberration can be eliminated for a single lens by *aspherizing*.

1L. A field stop controls the brightness of the image formed.

(2×10 = 20 marks)

PART – B

2A. Define Lateral shift. Derive an expression for the lateral shift for a ray of light passing through a parallel sided glass slab.

2B. Explain the terms:

i) optical path

ii) paraxial rays

iii) Magnification produced by a single spherical refracting surface

iv) Power of a spherical refracting surface.

2C. Explain the graphical method for ray tracing through a prism.

2D. Deduce the refraction matrix for refraction at a plane interface separating two media.

2E. What is an aberration? Explain briefly the various types of aberrations which can arise in the image formed by a lens.

2F. Deduce an expression for the numerical aperture of an optic fiber.

2G. Explain the construction and working of a Ruby laser.

2H. i) Write Augustin Cauchy's equation for normal dispersion and explain the same.
ii) Explain the different types of emission spectra from light sources.

2I. With the help of a neat diagram showing the eye- piece adjusted to give the image at infinity, explain the construction and working of an astronomical telescope.

2J. Explain the six cardinal points of a thick lens.

(5×8 = 40 marks)

PART – C

3A. A ray of light passes from diamond of refractive index 2.42 to glass of refractive index 1.55. Calculate
i) refractive index of diamond with respect to glass.
ii) refractive index of glass with respect to diamond.
iii) the deviation of the ray when the angle of incidence is 18°.
iv) ratio of velocities of light in glass and diamond.

3B. A black spot on a glass sphere of 0.05 m radius is viewed through the glass from the position directly opposite. If the spot appears to be 0.2 m from the surface through which it is observed, what is the refractive index of glass?

3C. 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.

3D. A thin lens with an aperture of 5.0 cm and a focal length of +4.0 cm has a 3.0 cm stop located 2.0 cm in front of it. An object 1.5 cm high is located with its lower end on the axis 9.0 cm in front of the lens. Find
i) the position and
ii) the size of the exit pupil.

3E. A thick lens with radii $r_1 = -4.50$ cm and $r_2 = -3.60$ cm has a thickness of 3.0 cm and an index of 1.560. Calculate
i) the focal length and
ii) the power of the lens.

3F. A three level laser emits light of wavelength 550 nm. What is the ratio of population of the upper level (E_2) to that of the lower level (E_1) in laser transition, at 300 K?

3G. A positive thin lens of focal length 10 cm is separated by 5 cm from a thin negative lens of focal length –10 cm. Find the equivalent focal length of the combination using the matrix approach.

(4×5 = 20 marks)