Reg. No.										

MANIPAL UNIVERSITY

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

SUBJECT: GENERAL ANATOMY AND OCULAR ANATOMY

Monday, August 23, 2010

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

1. Explain the parts of vascular coat of the eyeball with the help of a labeled diagram.

(12 marks)

2. Write short notes on:

2A. Anal canal

2B. Functional areas of cerebrum

2C. Retina

(6×3 = 18 marks)

3. Write notes on:

3A. Cerebrospinal fluid

3B. Pituitary gland

3C. Urinary bladder

(5×3 = 15 marks)

4. Write briefly on:

4A. Trachea

4B. Spermatic cord

4C. Vas deferens

4D. Oculomotor nerve

4E. Parotid gland

(4×5 = 20 marks)

5. Write briefly on:

5A. Porta hepatis

5B. Lateral ventricle

5C. Fibrous joint

5D. Movements of vocal cords

5E. Oropharynx

(3×5 = 15 marks)

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MANIPAL UNIVERSITY

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

SUBJECT: GENERAL BIOCHEMISTRY AND OCULAR BIOCHEMISTRY

Wednesday, August 25, 2010

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

- **Answer section 'A' and section 'B' in two separate answer books.**
- **Draw diagrams and flow charts wherever appropriate.**

SECTION – A: GENERAL BIOCHEMISTRY: 40 MARKS

- **Answer all questions.**

1. Discuss urea cycle under the following headings:

1A. Site and subcellular site.
1B. Reactions.
1C. Mention **TWO** disorders of urea cycle and their defective/deficient enzyme.

(1+5+2 = 8 marks)

2. Classify enzymes giving **ONE** example for each class.

(6 marks)

3. Write briefly on:

3A. Reactions of ketolysis.
3B. **FOUR** differences between marasmus and kwashiorkor.
3C. Causes and biochemical findings of metabolic acidosis.
3D. Dietary sources and functions of vitamin C.

(4×4 = 16 marks)

4. Explain the following with an example.

4A. Essential fatty acids.
4B. Specific dynamic action.
4C. Positive nitrogen balance.
4D. Proenzymes.
4E. Mutual supplementation of proteins.

(2×5 = 10 marks)

SECTION – B : OCULAR BIOCHEMISTRY: 40 MARKS

5. Discuss the biochemical composition of the cornea including the metabolism of the cornea

(10 marks)

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

6A. Briefly write the factors affecting the aqueous humor composition.
6B. Write a note of transparency of lens.
6C. Draw the structure of RPE and discuss the composition.
6D. Write a note on antioxidant and their therapeutic uses.
6E. Describe the diagnostic tests to detect tear film abnormality.
6F. Describe the physical properties of semisoft contact lens.
6G. Write briefly the macromolecular constituents of vitreous humour.

(5×6 = 30 marks)

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MANIPAL UNIVERSITY

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

SUBJECT: PHYSICAL OPTICS

Thursday, August 26, 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 TEN only.

1A. An object attached to one end of a spring makes 20 vibrations in 10 s. Its frequency is 2Hz.

1B. Newton's corpuscular theory failed to explain the Interference phenomenon.

1C. A liquid of refractive index n = 4/3 replaces the air between a fixed wedge formed from two glass plates. As a result, the spacing between adjacent dark bands in the interference pattern decreases to 3/4 of its original value.

1D. Newton's rings will expand in size when the transparent liquid of refractive index n=1.38 between the lens and the optical flat is replaced by a transparent liquid of refractive index n=1.33.

1E. In Young's double-slit experiment the fringe width increases by bringing the two coherent sources close to each other.

1F. A lens with a refractive index of 1.5 is coated with a material of refractive index 1.2 in order to minimize reflection. If λ denotes the wavelength of the incident light in air, the thickness of the coating is 0.208λ.

1G. As more slits with the same spacing are added to a diffraction grating the lines becomes narrower.

1H. Intensity of the central maximum in single slit diffraction is proportional to the slit width.

1I. To achieve high resolving power, one must use grating consisting of large number of rulings.

1J. Along the optics axis the extra-ordinary ray travels with same velocity as ordinary ray.

1K. Polarization of light conclusively proves that light waves are longitudinal.

1L. Mie scattering occurs when size of the particles is larger than about one-tenth of a wavelength.

(2×10 = 20 marks)

2. Answer any SIX of the following.

2A. Write short notes on: i) Fresnel's Biprism ii) Lloyd's single mirror.

2B. Show that simple harmonic motion can be described as the projection of uniform circular motion along a diameter of the circle.

2C. Derive the conditions for interference of the reflected light from a thin transparent film of uniform thickness. How do these conditions change for the transmitted light?

2D. Discuss briefly the rectilinear propagation of light based on the Fresnel's half-period Zones.

2E. Mention two differences between the following:

i) Fraunhofer and Fresnel diffraction ii) Newton's rings and Michelson's rings

iii) Prism spectra and Grating spectra.

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

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

2H. Explain briefly Raman scattering of light.

(6×6 = 36 marks)

3. Answer any SIX of the following.

3A. A double slit has a spacing of 0.99 mm between the slits. A screen is located at a distance of 1.08 m from the slits. What wavelength of light will have its first maximum at an angle of 0.11^{o}?

3B. A thin film of oil (n = 1.50) floats on a thick layer of water (n = 1.33). Light, whose wavelength is 487nm in air, is incident normally on the film. i) What is the difference in phase between the ray reflected at the air-oil interface and the ray reflected at the oil-water interface due to the different reflection? ii) What is the minimum thickness of film needed for constructive interference?

3C. In a Newton's rings experiment the diameter of the 12^{th} ring changes from 1.50cm to 1.35cm when a liquid is introduced between the lens and the plate. Calculate the refractive index of the liquid.

3D. The diameter of the central zone of a zone plate is 2.3mm. If a point source of light (λ=5893A^{o}) is placed at a distance of 6m from it. Calculate the position of the first image.

3E. A double slit consists of two slits, each of width 5.3×10^{-6} m, separated by a distance of 8.2×10^{-5} m. Light of wavelength 499 nm is incident on the slits. i) At what angle will the first diffraction minimum occur? ii) How many interference fringes are contained within the central bright diffraction fringe?

3F. A plane transmission diffraction grating has 200 rulings/mm and the principal maximum is noted at θ=28°. What are the possible wavelengths of the incident visible light?

3G. A ray of light is incident on the surface of a glass plate of refractive index 1.53 at the polarizing angle. Calculate the angle of refraction.

3H. A lamp of 500 candle-power is suspended 60m above the ground. Find the illumination i) at a point P vertically below the lamp and ii) at a point Q, 80m from P.

(4×6 = 24 marks)

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MANIPAL UNIVERSITY

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

SUBJECT: GEOMETRICAL OPTICS

Friday, August 27, 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. The power of a lens made up of glass (R.I of glass = 3/2) is +1.25D inside water(R.I of water = 4/3) if its power in air is +5D.

1B. A virtual image can never be photographed.

1C. The purpose of He atoms in He - Ne gas laser is to help in achieving a population inversion in the Ne atoms.

1D. 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.

1E. Coma is an off axis spherical aberration.

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

1G. The photo electric current is directly proportional to the intensity of incident radiation and independent of the frequency.

1H. The minimum length of a mirror that is needed for a person of height H to see his entire reflection is (H/3).

1I. Optical path length can never be less than the geometrical path length.

1J. Dispersive power of the prism depends on its refracting angle.

1K. The fact that electrons are emitted almost instantaneously in Photoelectric effect is in consistent with the particle theory of light.

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

(2×10 = 20 marks)

PART – B

2. Answer any EIGHT of the following.

2A. State Fermat's principle. Prove the law of refraction of light at a plane surface using Fermat's principle.

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

2C. With the help of a neat diagram, explain the working of He-Ne LASER.

2D. Derive the condition that the combination of two thin prisms of different materials may produce dispersion without deviation. Find the dispersion produced by the combination.

2E. What is a system matrix? Give the physical significance of its components.

2F. Explain briefly the defects of an image produced by a lens. How they can be minimized?

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

2H. Derive Lens maker's formula.

2I. Discuss the inadequacy of classical electromagnetic theory in explaining Photoelectric effect. How did Einstein explain this?

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 thin converging lens and a thin diverging lens are placed co-axially in air at a distance of 5cm. If the focal length of each lens is 10 cm find the focal length and power of the combination.

3B. The dispersive powers of crown and flint glasses are 0.03 and 0.05 respectively. If the difference in the refractive indices of blue and red colors is 0.014 for crown glass and 0.023 for flint glass, calculate the angles of the two prisms for a deviation of 10° 9 without dispersion).

3C. The refractive index of the material of a prism of refractive angle 45° is 1.6 for a certain monochromatic ray. What would be the minimum angle of incidence of this ray on the prism so that no total internal reflection takes place as the ray comes out of the prism.

3D. A ruby laser delivers a 10 ns pulse of 1MW power. If all the photons are of wavelength 694.3 nm, how many photons are contained in the pulse?

3E. A step index multimode fiber has a core of refractive index 1.50 and fractional index change, $\Delta = 0.015$. Calculate (i) the refractive index of cladding, (ii) numerical aperture (NA) and (iii) the maximum acceptance angle.

3F. The work function of Aluminium is 4.2 eV. Calculate the Kinetic energy of the fastest and slowest photoelectrons, the stopping potential and the cut off wavelength when the light of wavelength 200nm falls on a clean Aluminium surface.

[Planck's constant (h) = 6.626×10^{-34} J s, 1eV = 1.602×10^{-19}J, Mass of the electron (m_e) = 9.11×10^{-31}kg].

(4×5 = 20 marks)