Reg. No.										

MANIPAL UNIVERSITY

FIRST YEAR B.Sc. CLINICAL OPTOMETRY DEGREE EXAMINATION – AUGUST 2011

SUBJECT: GENERAL PHYSIOLOGY AND OCULAR PHYSIOLOGY

Tuesday, August 23, 2011

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

✍ **Answer all questions.**

1. Essay:

1A. Mention the functions of hypothalamus. Explain any two functions.

1B. Name the hormones of anterior pituitary and posterior pituitary. Mention one function of each of these hormones.

(10+10 = 20 marks)

2. Write short notes on:

2A. Functions of stomach.

2B. Glomerular filtration rate.

2C. Functions of middle ear.

2D. Transport of oxygen in blood.

2E. Functions of placenta.

2F. Stretch reflex.

2G. Functions of platelets.

2H. Actions of aldosterone and cortisol.

(5×8 = 40 marks)

3. Write brief answers to the following:

3A. Draw a labelled diagram of a sarcomere.

3B. Tabulate two differences between smooth and skeletal muscles.

3C. Mention two factors affecting cardiac output.

3D. Define stroke volume and give its normal value.

3E. Mention two actions of testosterone.

3F. Name the hormones secreted by the ovary.

3G. List two differences between a cretin and a pituitary dwarf.

3H. Mention any two features of cerebellar lesion.

3I. List any two differences between sympathetic and parasympathetic nervous system.

3J. Mention the location in the cerebral cortex where visual and auditory impulses are relayed.

(2×10 = 20 marks)

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MANIPAL UNIVERSITY

FIRST YEAR BACHELOR OF CLINICAL OPTOMETRY DEGREE EXAMINATION – AUGUST 2011

SUBJECT: GENERAL BIOCHEMISTRY AND OCULAR BIOCHEMISTRY

Wednesday, August 24, 2011

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

- **ANSWER SECTION 'A' AND SECTION 'B' IN TWO SEPARATE ANSWER BOOKS.**
- **Answer ALL the questions. Draw diagrams and flow charts wherever appropriate.**

SECTION – A: GENERAL BIOCHEMISTRY: 40 MARKS

1. Write in detail the synthesis of glucose from pyruvate.

(8 marks)

2. Discuss the metabolism of calcium under the following headings:
2A. Factors favouring and hindering absorption.
2B. **SIX** functions.

(3+3 = 6 marks)

3. Answer the following:

3A. With the help of a graph describe the effect of substrate concentration on enzyme activity.
3B. Write the reactions of ketogenesis.
3C. Explain the structure of Watson and Crick model of DNA.
3D. Name the lipoproteins and mention the function of each.

(4×4 = 16 marks)

4. Answer the following:

4A. Mention four differences between kwashiorkor and marasmus.
4B. Write short notes on the principle buffer system of the ECF.
4C. Write four functions of essential fatty acids.
4D. Define transamination reaction. Give one example.
4E. Give the co-enzyme form and the deficiency manifestations of thiamine and niacin.

(2×5 = 10 marks)

SECTION – B : OCULAR BIOCHEMISTRY: 40 MARKS

5. Describe visual cycle in detail.

(10 marks)

6. Write short notes on any SIX:

6A. Cyclic GMP.
6B. Acetyl Choline.
6C. Sorbital pathway.
6D. Tear film layers.
6E. Lens proteins.
6F. Soft contact lenses.
6G. Balanced salt solution.

(5×6 = 30 marks)

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MANIPAL UNIVERSITY

FIRST YEAR BACHELOR OF CLINICAL OPTOMETRY DEGREE EXAMINATION – AUGUST 2011

SUBJECT: PHYSICAL OPTICS

Thursday, August 25, 2011

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 questions only.

1A. Torsional pendulum is an example for simple harmonic motion.

1B. In a Young's double-slit experiment, the slit separation is doubled. To maintain the same fringe spacing on the screen, the screen-to-slit distance D must be changed to 2D.

1C. Monochromatic light, at normal incidence, strikes a thin film in air. If λ denotes the wavelength in the film, the thinnest film in which the reflected light will be a maximum is $\lambda/4$.

1D. In Newton's experiment by reflection, the centre of the fringe system can be rendered bright by introducing a liquid film between the lens and the flat glass plate such that refractive index of the liquid has a value lying between the refractive indices of the lens and the glass plate.

1E. Circularly polarized light consists of two perpendicular electromagnetic plane waves of equal amplitude and 90° difference in phase.

1F. If the velocity of the extraordinary ray is greater than the ordinary ray except along optic-axis, then the crystal is known as negative crystal.

1G. Zone plate is an application of Fresenl's type of diffraction.

1H. Resolving power of grating can be increased by decreasing the number of rulings in the grating.

1I. Dispersion does not depend on the number rulings in the grating.

1J. Unit of Luminous power is lux.

1K. The Sky looks black as seen from the moon.

1L. Rayleigh scattering occurs when the scattering particles are of size much bigger than the wavelength of incident light.

(2×10 = 20 marks)

2. Answer any SIX of the following.

2A. Discuss briefly the Lloyd's single mirror experiment.

2B. Show that the sum of two simple harmonic motions of the same frequency and along the same line is also a simple harmonic motion of the same frequency.

2C. Explain how Michelson's interferometer is used to determine

i) the wavelength separation of two close wavelengths

ii) the thickness of a thin transparent sheet.

2D. Mention two differences between the following:

i) Newtons's rings and Michelson's rings

ii) Zone plate and Convex lens

iii) Prism spectra and Grating spectra.

2E. Write short note on:

i) Quarter wave plate ii) Half wave plate.

2F. Discuss the diffraction phenomenon at a circular aperture qualitatively.

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. In a double slit arrangement the slits are separated by a distance equal to 100 times the wavelength of the light passing through the slits.

i) What is the angular separation in radians between the central maximum and an adjacent maximum?

ii) What is the distance between these maxima on the screen 50cm from the slits?

3B. A square piece of cellophane film with index of refraction 1.5 has wedge shaped section so that its thickness at the two opposite sides are t_1 and t_2. If with a light $\lambda = 6000A^{\circ}$, the number of fringes appearing in the film is 10. Calculate the difference $t_2 - t_1$.

3C. In a Michelson's interferometer 200 fringes cross the field of view when the movable mirror is displaced through 0.0589mm. Calculate the wavelength of monochromatic light used.

3D. A zone plate is made by arranging the radii of the circles which define the zones such that they are the same as the radii of Newton's dark rings formed between a plane surface and the surface having radius of curvature 200cm. Find the principal focal length of the zone plate.

3E. A plane wave of wavelength 590nm is incident on a slit with a width of a=0.40mm. A thin converging lens of focal length +70cm is placed between the slit and a viewing screen and focuses the light on the screen.

i) How far is the screen from the lens?

ii) What is the distance on the screen from the centre of the diffraction pattern to the first minimum?

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

3G. A 20cm long tube containing sugar solution rotates the plane of polarization by 11°. If the specific rotation of sugar solution is 66°, calculate the strength of the solution.

3H. A small source of 200 candle-power is suspended 3m vertically above a point P on a horizontal surface. Calculate the illumination at

i) the point P and ii) at a point Q, 4m from P

(4×6 = 24 marks)

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MANIPAL UNIVERSITY

FIRST YEAR BACHELOR OF CLINICAL OPTOMETRY DEGREE EXAMINATION – AUGUST 2011

SUBJECT: GEOMETRICAL OPTICS

Friday, August 26, 2011

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 maximum Kinetic energy of the photoelectrons increases as the wavelength of the incident light increases.

1B. Diffraction of light facilitates lossless energy transmission through optical fiber.

1C. Chromatic aberration is the result of varying focal lengths for rays passing through different zones of a lens surface.

1D. In the ABCD matrix element D=0 signifies that the input plane coincides with the primary focal 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. Larger the angle of the prism smaller is the deviation of light.

1H. The minimum length of a mirror that is needed for a person of height H to see his entire reflection is (H/4).

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. If light converges to a point 2m away then vergence is + 2D.

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. i) Derive the expression for the focal length of a convex lens where the distance between the object and image is fixed and the lens gives a magnified image.

ii) Derive Newton's formula for the focal length of a convex lens.

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

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

2H. Derive Lens maker's equation.

2I. Explain how wave theory fails to explain the observed facts in Photoelectric effect. Derive Einstein's Photoelectric equation.

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 mark)

PART – C

3. Answer any FIVE of the following.

3A. A ray of light incident on a transparent liquid is partially reflected and partially refracted. The angle between the reflected and refracted rays is found to be 98° while the angle between the incident and refracted rays is found to be 162°. Calculate the refractive index of the liquid.

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 pulsed laser emits photons of wavelength 780 nm with 20 mW average power / pulse. Calculate the number of photons contained in each pulse if the pulse duration is 10 ns.

3E. Two lenses having focal lengths F_1= + 9 cm and F_2 = - 18 cm are placed 3cm apart. If an object 2.5 cm high is placed 20 cm in front of the first lens, calculate the position and size of the final image.

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:

i) a value for the Planck's constant

ii) the work function for sodium and

iii) cut off wavelength for sodium.

(4×5 = 20 marks)