Reg. No.										

MANIPAL UNIVERSITY

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

SUBJECT: GENERAL ANATOMY AND OCULAR ANATOMY

Monday, June 06, 2011

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

1. Name all the endocrine glands. Mention the position, parts, relations, blood supply and nerve supply of pancreas.

(2+10 = 12 marks)

2. **Write short notes on:**

2A. Stomach

2B. Testis

2C. Choroid

(6×3 = 18 marks)

3. **Write notes on:**

3A. Internal capsule.

3B. Para nasal air sinuses.

3C. Right lung.

(5×3 = 15 marks)

4. **Write briefly on:**

4A. Nasal septum.

4B. Typical synovial joint.

4C. Ophthalmic artery.

4D. Ureter.

4E. Cornea.

(4×5 = 20 marks)

5. **Write briefly on:**

5A. Uterine tube.

5B. Gall bladder.

5C. External features of midbrain.

5D. Ciliary body.

5E. Types of neurons.

(3×5 = 15 marks)

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MANIPAL UNIVERSITY

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

SUBJECT: GENERAL PHYSIOLOGY AND OCULAR PHYSIOLOGY

Wednesday, June 08, 2011

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

Answer all questions.

1. Describe the stages of erythropoiesis. Add a note on regulation of erythropoiesis.

(10 marks)

2. Mention any six functions of hypothalamus. Explain any two.

(10 marks)

3. **Write short notes on the following:**

3A. Describe the chemical regulation of respiration.
3B. Draw a neat labelled diagram of the stretch reflex arc.
3C. Describe the process of deglutition.
3D. Enumerate the events of neuromuscular transmission.
3E. Describe erythroblastosis fetalis.
3F. Define glomerular filtration rate (GFR). Give its normal value. Describe the factors affecting GFR.
3G. Mention the hormones of anterior pituitary. Describe the functions of any two.
3H. Describe the functions of middle ear.

(5×8 = 40 marks)

4. **Write brief answers to each of the following:**

4A. Define the following terms:
  i) Vital capacity ii) Cyanosis
4B. Mention two clinical features of cerebellar lesion
4C. Name the hormones of ovaries. State one function of each.
4D. What is myopia? How is it corrected?
4E. List two uses of an electrocardiogram (ECG).
4F. Draw a neat labelled diagram of a nephron.
4G. Mention two differences between passive transport and active transport.
4H. Name one permanent contraceptive method in males and females.
4I. What is Cushing's syndrome? Mention two clinical features of this syndrome.
4J. Give the average normal value for the following:
  i) Hemoglobin concentration in adult males
  ii) Cardiac output in adults

(2×10 = 20 marks)

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MANIPAL UNIVERSITY

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

SUBJECT: GENERAL BIOCHEMISTRY AND OCULAR BIOCHEMISTRY

Friday, June 10, 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 the reactions of synthesis of glucose from lactate.

(8 marks)

2. Write the reactions of urea cycle.

(6 marks)

3. **Write short notes on the following:**

3A. Structure of DNA.
3B. Activation of zymogens in the GIT.
3C. Mechanisms of glucose absorption in the small intestine.
3D. Biochemical functions and deficiency manifestations of vitamin D.

(4×4 = 16 marks)

4. **Write briefly on:**

4A. Basal metabolic rate.
4B. Inhibitors of electron transport chain.
4C. Dietary fibers.
4D. Transamination reaction.
4E. Emulsification of fats.

(2×5 = 10 marks)

SECTION – B : OCULAR BIOCHEMISTRY: 40 MARKS

5. Discuss the composition, physical properties, cleaning and sterilization of soft contact lenses.

(10 marks)

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

6A. Discuss the mechanism of development of senile cataract.
6B. Describe the structure, composition and function of vitreous humor. Add a note on intraocular gels.

6C. Antioxidants and their role in the eye.

6D. Write a note on retinal neuro transmitters and discuss the biochemical basis of retinal diseases.

6E. Write a note on photoreceptors of eye.

6F. Medical therapy of cataract.

6G. Describe the biochemical composition of corneal layers.

(5×6 = 30 marks)

Reg. No.										

MANIPAL UNIVERSITY

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

SUBJECT: PHYSICAL OPTICS

Monday, June 13, 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. In simple harmonic motion, the magnitude of the acceleration is proportional to the displacement.

1B. The center of the Newton's rings seen in reflected systems appears dark.

1C. If Young's double-slit experiment were performed under water, the fringe width remains same as in air.

1D. A thin film of oil (n = 1.50) floats on a thick layer of water (n = 1.33). Light of wavelength is 487nm is incident normally on the film. The difference in phase between the ray reflected at the air-oil interface and the ray reflected at the oil-water interface is 180°.

1E. Zone plate acts like a convex lens of multiple foci.

1F. By increasing the number of slits in a grating, the principal maxima become much more intense and narrower.

1G. The width of the central maximum in the single-slit diffraction pattern increases as the width of the slit decreases.

1H. The resolving power of a telescope can be increased by increasing the lens diameters.

1I. Unpolarized light of intensity I_i, is incident on a polarizer with a vertical polarizing axis. The analyzer is placed in the path of the light transmitted by the polarizer. If the polarizing axis of the analyzer is horizontal, the intensity of the light transmitted by the analyzer is **zero**.

1J. Light from the sky is partially polarized.

1K. In the double refraction phenomenon, the ordinary and extraordinary rays are polarized in mutually perpendicular directions.

1L. Rayleigh scattering is independent of the wavelength.

(2×10 = 20 marks)

2. Answer any SIX of the following:

2A. Explain briefly Huygen's wave theory of light.

2B. Describe Fresnel's biprism. With relevant theory, explain how the wavelength of light can be determined using Fresnel's biprism.

2C. With a neat sketch explain the construction and working of Michelson's interferometer.

2D. Distinguish between:

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

2E. Give the construction and working of a Lummer-Brodhum photometer.

2F. Explain Rayleigh's criterion for optical resolution with intensity distribution graph, and hence obtain the expression for the resolving power of a diffraction grating.

2G. Derive the general equation of polarization ellipse. Discuss the conditions for linear and elliptical polarization states.

2H. Write a short note on:

i) Rayleigh scattering ii) Mie scattering iii) Raman scattering.

(6×6 = 36 marks)

3. Answer any SIX of the following:

3A. Monochromatic green light of wavelength 550nm illuminates two parallel narrow slits 7.70μm apart. Calculate the angular deviation of the third order bright fringe (m=3).

i) in radians ii) in degrees.

3B. A soap film of n=1.333 is illuminated by white light incident at an angle 45°. The light refracted by it is examined by a spectrometer and a bright band is found corresponding to a wavelength of 600nm. Find the thickness of the film.

3C. In a Newton's rings experiment the radius of curvature R of the lens is 5.0 m and its diameter is 20mm.

i) How many dark rings are produced in reflected light?

ii) How many dark rings would be seen if the arrangement were immersed in water (n=1.33)? (λ =589 nm).

3D. An air tight chamber 5.0 cm long with glass windows is placed in one arm of a Michelson interferometer. Light of λ = 500nm is used. Air is slowly evacuated form the chamber using a vacuum pump. While the air is being removed, sixty fringes are observed to pass through the field of view. Find the index of refraction of air.

3E. A diffraction grating has 10^4 rulings uniformly spaced over 25mm. It is illuminated normally using a sodium lamp containing two wavelengths 589.0 nm and 589.59 nm.

i) At what angle will the first order maximum occur for the first of these wavelengths?

ii) What is the angular separation between the first order maxima for these lines?

3F. A source containing a mixture of hydrogen and deuterium atoms emits red light at two wavelengths whose mean is 656.3 nm and whose separation is 0.180 nm. Find the minimum number of lines needed in a diffraction grating that can resolve these lines in the first order.

3G. Plane polarized light passes through a quartz plate with its optic axis parallel to the faces. Calculate the least thickness of the plate for which the emergent beam will be plane polarized. Given:λ =500.0nm; μ_o = 1.5442; μ_e = 1.5533.

3H. 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.

(4×6 = 24 marks)

Reg. No.										

MANIPAL UNIVERSITY

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

SUBJECT: GEOMETRICAL OPTICS

Wednesday, June 15, 2011

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

✍ **Write the question number clearly on the left margin.**

PART – A

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

1A. Spontaneous emission gives coherent light.

1B. A pinhole camera casts on the screen an image of 40.0 cm in size of an object situated at a distance of 40.0 m from the camera. Then size of the object is 10.0 m.

1C. When the ray of light goes from rarer to denser medium then it bends away from normal?

1D. If $\begin{bmatrix} A & B \\ C & D \end{bmatrix}$ is a system matrix of an optical system, then $B = 0$ implies that the output plane is second focal plane.

1E. Nodal planes are the planes of unit angular magnification.

1F. In spherical aberration light of different wavelengths will converge at different points.

1G. To correct myopic vision positive lens is required.

1H. Focal length of the objective in a telescope is less than that of the eyepiece.

1I. Concave mirror always forms real image.

1J. In an optical fiber refractive index of the core should be less than the cladding.

1K. Entrance window controls the brightness of the image.

1L. In photoelectric effect the cutoff frequency depends upon the intensity of incident light.

(2×10 = 20 marks)

PART – B

2. Answer any EIGHT of the following:

2A. Using Fermat's principle, derive the law of reflection.

2B. State laws of refraction and with the help of a neat ray diagram obtain the expression for normal shift.

2C. With the help of a neat diagram, deduce the Gaussian formula for refraction of light at a single spherical surface.

2D. Show that when two thin lenses are placed in contact the power of the combination is given by the sum of the powers of individual lenses.

2E. Write a note on spherical aberration.

2F. With a neat diagram explain the working of an astronomical telescope and obtain an expression for its magnification in normal adjustment.

2G. Obtain system matrix for a thick lens.

2H. Explain three components of a laser.

2I. What is numerical aperture? Obtain an expression for it in terms of refractive index of core and cladding.

2J. Define myopia. Show with the help of a neat diagram how it is corrected with a lens?

(5×8 = 40 marks)

PART – C

3. Answer any FIVE of the following:

3A. i) A plane parallel slab of glass 4.0 cm thick and refractive index 1.6 is laid over a sheet of newsprint. When one looks down through the glass, by how much will the newsprint appear to lift up?

ii) Critical angle for glass is 41.0°. What is the refractive index of glass?

3B. Calculate the deviation produced by a prism of angle 60.0°and refractive index 1.5 for a ray of light incident on one face at an angle of 48.0°.

3C. A biconvex lens of 50.0 mm focal length is made of glass of n = 1.52. If the radius of curvature is twice as long as the radius of the front surface, what are the two radii?

3D. The stopping potential for photoelectrons emitted from a surface illuminated by light of wavelength 491.0 nm is 710.0 mV. When the incident wavelength is changed to a new value, the stopping potential is found to be 1.43eV. i) What is this new wavelength? ii) What is the work function for the surface?

3E. With an object 2.0 m away, a concave mirror forms a real image 50.0 cm away .Using matrices, find the radius of curvature of the mirror.

3F. A compound microscope is made up of two lenses each having 50.0 diopter power separated by 14.0 cm. What is the magnification and object distance?

3G. A lens of 50mm focal length and 36.0 mm diameter is used as a magnifier. If a stop 12.0 mm in diameter is placed 10.0 mm to the right of the lens. How far from the lens is the entrance pupil? And, what is its diameter?

(4×5 = 20 marks)