Reg. No.										

MANIPAL UNIVERSITY

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

SUBJECT: GENERAL ANATOMY AND OCULAR ANATOMY

Wednesday, August 05, 2009

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

1. Describe the lateral wall of the nose. Add a note on its blood supply and nerve supply.

(6+3+3 = 12 marks)

2A. Lacrimal apparatus

2B. Thyroid gland

2C. Fourth ventricle

(6×3 = 18 marks)

3A. Boundaries and contents of posterior mediastinum

3B. Soft palate

3C. Dorsum of tongue

(5×3 = 15 marks)

4A. Cardiac muscle

4B. Internal capsule

4C. Pituitary gland

4D. Testis

4E. Urinary bladder

(4×5 = 20 marks)

5A. Spermatic cord

5B. Differences between jejunum and ileum

5C. Structure of a lymph node

5D. Aqueous humor

5E. Corpus striatum

(3×5 = 15 marks)

Reg. No.										

MANIPAL UNIVERSITY

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

SUBJECT: GENERAL PHYSIOLOGY AND OCULAR PHYSIOLOGY

Thursday, August 06, 2009

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

1. Define the terms systolic and diastolic blood pressures. Give their normal values. Explain the role of baroreceptors in the regulation of blood pressure.

(10 marks)

2. Name two ascending and two descending tracts. Mention the function of each tract. Trace the pathway of any one. State two differences between upper motor neuron and lower motor neuron lesions.

(10 marks)

3. Short essays:

3A. In the form of a flow chart describe the intrinsic and extrinsic pathways of blood clotting.
3B. Draw a labelled diagram of a neuron. Explain the functions of different parts.
3C. Describe the composition and functions of saliva.
3D. Explain how oxygen is transported in the body.
3E. What causes acromegaly and cretinism? Mention two clinical features of each of these conditions.
3F. Outline the mechanism of urine formation.
3G. Explain the mechanism of hearing.
3H. Mention the different types of transport mechanisms that occur across a cell membrane. Explain any one.

(5×8 = 40 marks)

4. Write short answer to each of the following:

4A. Define the following terms and give their normal values
  i) Tidal volume
  ii) Stroke volume
4B. Define 'muscle fatigue'. Mention the cause fatigue.
4C. Mention the functions of middle ear.
4D. State the functions of platelets.
4E. Mention two clinical features of Parkinson's disease.
4F. What is the normal heart rate? Mention two factors that increase heart rate.
4G. Mention two actions of cortisol. Name the condition that results due to excess cortisol production.
4H. Enumerate the changes that occur when one is exposed to hot environment.
4I. Give the components of bile.
4J. Mention two actions of testosterone.

(2×10 = 20 marks)

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MANIPAL UNIVERSITY

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

SUBJECT: GENERAL BIOCHEMISTRY AND OCULAR BIOCHEMISTRY

Friday, August 07, 2009

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. Classify enzymes giving one example for each class.

(6 marks)

2. Describe the biochemical changes occurring after intake of milk in a person with lactose intolerance.

(4 marks)

3. Write the reactions of the citric acid cycle.

(6 marks)

4. Describe the process of digestion of dietary lipids in the GI tract.

(5 marks)

5. Classify amino acids on the basis of their metabolic fate giving examples for each class.

(3 marks)

6. Give the steps involved in the beta oxidation of palmitic acid.

(6 marks)

7. Define dietary fibers and describe their role in nutrition.

(3 marks)

8. Give the dietary sources, RDA and describe the absorption of iron.

(3 marks)

9. Mention the normal serum levels and one condition in which they are altered for glucose, protein, urea and cholesterol.

(4 marks)

SECTION – B : OCULAR BIOCHEMISTRY: 40 MARKS

10. Discuss in detail the composition of crystalline lens and lens metabolism.

(10 marks)

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

11A. Describe biochemical composition of corneal endothelium with a note on endothelial pump mechanism.

11B. Tear film dysfunctions and recent development in the treatment of tear film dysfunction.

11C. Rigid gas permeable contact lenses.

11D. Describe the structure and composition of pigment epithelium of retina.

11E. Role of free radicals in ocular diseases.

11F. Write short note on contact lens contaminants, cleaning and sterilization of the contact lenses.

11G. Rhodopsin cycle.

(5×6 = 30 marks)

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MANIPAL UNIVERSITY

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

SUBJECT: PHYSICAL OPTICS

Saturday, August 08, 2009

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. The phase angle between the projections of uniform circular motion on two mutually perpendicular diameters is zero.

1B. Human eye is more sensitive for red light than yellow light.

1C. When a radiating surface has radiance depending on the viewing angle, the surface is said to be a lambertian surface.

1D. Colors in thin films are due to diffraction.

1E. The contrast in the fringes in any interference pattern depends on intensity ratio of the sources.

1F. In a two slit experiment with white light, a white fringe is observed on a screen kept behind the slits. When the screen is moved away by 5 cm this white fringe does not move at all.

1G. Light appears to travel in straight lines because its wavelength is very small.

1H. Huygens wave theory failed in explaining the phenomena of diffraction of light.

1I. If a class room door is opened slightly; one can hear the sounds coming from the hallway because the open door is a large slit for sound waves and a small slit for light waves.

1J. In fraunhoffer diffraction both the incident and emergent wave fronts are not plane.

1K. An ideal polarizing sheet transmits 90% of the incident partially polarized light, then 100% of the transmitted light is polarized.

1L. In a three slit interference experiment, if the light from each of the three slits arrive in phase at the central maximum, then $I = 9\ I_0$. (I_0 is the intensity from a single slit)

(2×10 = 20 marks)

2. Answer any SIX of the following.

2A. Define SHM. Mention its characteristics. 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.

2B. Explain the construction and working of a Lummer – Brodhum photometer. Explain how it is used in determining the transmission coefficient of a material.

2C. Show that the diameters of bright rings in Newton's rings experiment are proportional to square root of natural odd numbers.

2D. Explain the construction and working of a Michelson interferometer. Explain how it is used in determining the thickness of a thin transparent material.

2E. What is a zone plate? Derive an expression for the focal length of a zone plate.

2F. Derive the grating equation for oblique incidence. Mention any two differences between prism spectra and grating spectra.

2G. Explain the construction and working of a Nicol prism.

2H. Explain briefly Raman scattering of light.

(6×6 = 36 marks)

3. Answer any SIX of the following.

3A. Two coherent radio point sources separated by 2m are radiating in phase with $\lambda = 0.25$ m. A detector moved in a circular path around the two sources in a plane containing them will show how many maxima.

3B. A soap film of refractive index 1.333 is illuminated by white light incident at an angle of 45^0. The light refracted by it is examined by a spectrometer and a bright band is found corresponding to a wavelength of 600 nm. Find the thickness of the film.

3C. A Plano convex lens of radius of curvature 300 cm is placed on an optically flat glass plate and is illuminated by monochromatic light. The diameter of the eighth dark ring in the transmitted system is 0.72 cm. calculate the wavelength of light used.

3D. A biprism is placed at 5.0 cm from a slit, illuminated by sodium light of wavelength 589.0 nm. The width of the fringes obtained on a screen 75.0 cm from the biprism is 9.424×10^{-2} cm. what is the distance between the two coherent sources.

3E. A slit 1.16 mm wide is illuminated by light of wavelength 589.0 nm. The diffraction pattern is seen on a screen 2.94 m away. Find the distance between the first two diffraction minima on the same side of the central maximum.

3F. The critical angle for a certain wavelength of light in the case of a piece of glass is 40^0. Find the polarizing angle for glass.

3G. A diffraction grating has a resolving power $R = Nm = \lambda/\Delta\lambda$. Show that the corresponding frequency range Δf that can just be resolved is given by $\Delta f = c/Nm\lambda$.

3H. If a mass of 4.0kg is suspended from the lower end of a coiled spring; it stretches a distance of 18.0 cm. If the spring is extended farther and released, it will be set vibrating up and down with simple harmonic motion. Find the i) spring constant ii) period iii) frequency and iv) total energy stored in the vibrating system.

(4×6 = 24 marks)

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MANIPAL UNIVERSITY

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

SUBJECT: GEOMETRICAL OPTICS

Monday, August 10, 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. Fermat's principle states that light going from one point to another in a particular medium takes the shortest path.

1B. Lateral shift is zero for normal incidence, ie., for an angle of incidence = 0°.

1C. Primary and secondary focal lengths of a spherical refracting surface are equal.

1D. For the same angles of incidence for blue and red light on a prism face, blue light deviates more inside the prism than red.

1E. The focal lengths in a thick lens are measured from the focal points to their respective vertices of the spherical surfaces.

1F. A concave lens always forms a virtual, magnified image of an object.

1G. In an ABCD system matrix, A = 0 means, the output plane functions as the second focal plane.

1H. Emission of photoelectrons from a photosensitive material depends only on the intensity of the radiation falling on the material.

1I. In the He- Ne laser, discharge tube diameters can not be made very large.

1J. Magnifying power of a telescope is just the ratio of focal lengths of eyepiece to objective.

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. What is refraction of light? State the laws of refraction of light. Define absolute and relative refractive indices.

2B. With the help of a neat diagram, derive the relation between the object distance, image distance, and the radius of curvature of a spherical refracting surface. Explain the sign convention used.

2C. What is a total reflecting prism? Explain how it can be used to turn a ray of light through (a) 90° and (b) 180°. Mention two advantages of total reflection prisms over mirrors.

2D. Illustrate the image formation by a convex lens using the parallel ray method, and hence derive the thin- lens equation.

2E. Explain briefly the first –order theory of lens aberrations. Give an account of spherical aberration produced in a thin lens.

2F. Trace graphically the entrance and exit pupil of a two lens system with a stop in between them. Show the chief ray passing through the system.

2G. Explain the following terms with reference to lasers: (i) spontaneous emission, (ii) stimulated emission, (iii) metastable state, (iv) population inversion.

2H. Deduce the reflection matrix for reflection from a concave mirror.

2I. Explain the working of a simple microscope. Obtain an expression for its magnification.

2J. Explain the ray propagation through an optic fiber using a neat diagram. Also explain briefly the different types of optic fibers and account for the reasons for signal loss in optic fibers.

(5×8 = 40 marks)

PART – C

3A. A ray of light of wavelength 600 nm in air is incident at 40° on a glass slab of refractive index 1.52. Calculate (a) wavelength of light in glass, (b) frequency of light, and (c) deviation of the ray.

3B. A small air bubble within a glass sphere of radius 9 cm is at a distance of 3 cm from the center of the sphere. When viewed from the nearest side the air bubble appears to be at a distance of 5 cm from the surface. What will be its apparent distance when viewed from the farthest side?

3C. A plano- convex lens has a thickness of 1.20 cm and the radius of curvature of its spherical surface is 2.50 cm. Determine the system matrix when light is incident on the curved surface. Refractive index of the material of the lens is 1.50.

3D. The real image of an object is magnified 4 times when a convex lens is placed at a distance of 15 cm from the object. What should be the distance between the object and the lens if the image is to be virtual and magnified twice?

3E. A glass lens of index 1.50, thickness 2 cm, and radii of 3 cm & -5 cm is surrounded by air. Calculate the primary and secondary focal lengths of each surface separately.

3F. The eye-piece and objective of a microscope are 20.6 cm apart, and each has a focal length of 6 mm. Treating these lenses as though they are thin lenses, find (a) the distance from the objective to the object viewed, (b) the linear magnification produced by the objective if the final image is formed at infinity.

3G. A ruby laser delivers a 20.0-ns pulse of 0.1MW average power/pulse. If the number of photons emitted per second is 6.98×10^{15}, Calculate wavelength of the photons.

(4×5 = 20 marks)