

Syllabus for Bachelors in Optometry Programme
(Effective for Students Admitted in Academic Session 2018-2019)

Detailed Syllabus

SEMESTER-I

Paper: GEOMETRICAL OPTICS

Code: BO-101

Contacts Hours / Week: 3L+0T

Credits: 3

Course Content	
Unit/ Module 1	What is light- dual nature- particle & wave nature, speed, wave length & frequency of light. Fermats' principle- laws of relation & refraction at a plane surface using Fermats' principle. Snells' law, relative and absolute refractive indices, total internal reflection and Critical angle, refraction by plane parallel slab of glass. Geometrical path length & optical path length of rays, Concept of wave fronts & rays, concept of vergence- divergence, convergence
Unit/ Module 2	<ul style="list-style-type: none">• Refraction by spherical surfaces- convex & concave, Derivation of vergence equation, focal points, deportee power, image point, lateral & axial magnification, simple numerical.• Thin Lens- shapes, derivation of lens makers' formula, thin lens vergece equation, equivalent focal length of two thin lenses separated by a distance & placed in contact, lateral magnification of thin lenses in contact, simple numerical, concept of reduced systems.• Thick Lens- Cardinal points & planes, front & back vertex power. Different types of aberrations & their effects.
Unit/ Module 3	<ul style="list-style-type: none">• Prism- Dispersion of prism, reflecting prisms , prisms diopters.• Geometrical theory of optical fibers. Uses of optical fibers.• Eye and Vision: Spectroradiometric curve- V_{λ} -λ curve- photopic and scotopic vision CIE standard observes.
Unit/ Module 4	<ul style="list-style-type: none">• Photometric quantities and units- Luminous Flux, Lumen- Illuminance, lux Luminous intensity, Candela• Luminance, Candela/m². Inverse square law and Cosine law of illumination (Illuminance)

Suggested Readings:

1. **Reference books-** GEOMETRICAL OPTICS- R.S.LONGURST, OPTICS- E.HECHT

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Paper: Physiology (General)

Code: BO-102

Contacts Hours / Week: 3L+1T

Credits: 4

Course Content	
Unit/ Module 1	<p>1.Genetics a. Nucleic acids-structure of DNA and RNA, their types, properties, replication of DNA, genetic code. b. Chromosomal aberration-structural and numerical aberration, gene mutation-definition and classification c. Application-genetics of colour blindness, ocular albinism, practical application of mutation.</p> <p>2.Blood vascular system Structures and functions of blood vessel types and their differences. Composition and functions of blood. Plasma proteins-types, origin, normal values, functions. Bone marrow-types and functions. Formed elements of blood-origin, formation, function, life span and fate, abnormalities of formed elements(both size and number)and related disease .Haemoglobin- structure , function and types of haemoglobin, abnormal haemoglobin and related diseases. Blood coagulation-factors, process, anticoagulants, CT and BT. Blood groups-ABO system, Rh factors, blood transfusion and consequences of incompatible blood transfusion. Terminologies-TC,DC,ESR,PCV,MCV,MCH, MCHC,ESR and their significances.</p>
Unit/ Module 2	<p>3.Cardio vascular system Structure and functions of heart. blood circulation types .special junctional tissues of heart and their importance. ECG. Cardiac cycle. Heart sounds. Cardiac output. blood pressure-definition, types, measurement method, significance of blood pressure measurement, controlling factors and regulation of blood pressure.</p> <p>4.Renal system Structure and functions of kidney. Structure and functions of nephron. Formation of urine(filtration, reabsorption,secretion).Anomalies of urine concentraiaon.Counter current system of urine concentration.</p>
Unit/ Module 3	<p>5.Neuro-physiology Structure and functions of neuron /nerve cell. Neuroglia. Myelinated and unmyelinated nerve fibre with their conduction velocity.Properties of nerve</p>

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	<p>fibre.synapse-structure,types,synaptictransmission,synaptic potential, neurotransmitter. ANS- Introduction, types, comparison of autonomic and somatic nervous system. NMJ-structure and events in transmission.</p> <p>6.Muscular physiology</p> <p>Microscopic structure of skeletal, smooth and cardiac muscles and their differences. Properties of muscle. Red and white muscle. Single unit and multi unit smooth muscles. Motor point. Slow and fast muscle fibers. Isotonic and Isometric contractions. The Sarcotubular system. Muscle contraction-E.C. Coupling, Rigor mortis.</p>
Unit/ Module 4	<p>7.Basic principles of Biology(Biophysical)and its application</p> <p>a. Diffusion-definition, factors affecting diffusion, biomedical or biological application of diffusion, Fick’s law of diffusion.</p> <p>b. Osmosis- definition, factors affecting osmosis, biomedical or biological application of osmosis, laws of osmosis.</p> <p>c - Acids, Bases, Ph-general overview</p> <p>d. Basic idea on Digestion and absorption of food</p> <p>e. Basic idea on respiratory system</p>

Reference books:

1. HUMAN PHYSIOLOGY: VOL 1 AND VOL 2-C.C.CHATTERJEE
2. PRINCIPLES OF ANATOMY AND PHYSIOLOGY- TORTORA,

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Paper: Anatomy (General)

CODE: BO103

Contact: 3L+0T

Credits: 3

Course Content	
UNIT/MODULE 1	<p><u>Introduction of anatomy – gross human anatomy & their relations :</u></p> <ul style="list-style-type: none"> • The skeleton – axial & appendicular (over view), Cavities of body- (cranial, thoracic, abdominal, pelvic). Structure of bone, Type & function of bone, Blood & nerve supply of the bone. Planes of the body. Anatomical terminology. • Skull – General features, Cranial bones (frontal, parietal, temporal, occipital, sphenoid, ethmoid). Facial bone – (nasal, maxilla, zygomatic, lacrimal, palatine, inferior nasal conchae, vomer, mandible). Special feature of the skull (sutures, paranasal sinuses, foramina, fontanelles, nasal septum). • Joints – classification, fibrous joints, cartilaginous joints, synovial joints (structure & types). Types of movement at synovial joints.
UNIT/MODULE 2	<p>Anatomy of muscular system – Skeletal muscle structure. Important skeletal muscle (muscles of facial expression, mastication. Muscle that move the head). Over view of Trunk muscles, upper limb muscles, lower limb muscles.</p> <p>Anatomy of nervous system – spinal cord anatomy (external & internal anatomy). Connection & distribution of spinal nerves-overview (Branches, plexuses. Intercostal nerves). Overview of brain organization & blood supply. Brief anatomical idea on – brain stem, cerebellum, diencephalon, cerebrum. Cranial nerves.</p>
UNIT/MODULE 3	<p><u>Embryology – general</u></p> <p>Gametogenesis (spermatogenesis & oogenesis) – Structure of testis, ovary & sperm – Phases of embryonic development – formation of three germ layers- derivatives of germ layers – Embryonic or Foetal membrane (chorion, amnion, allantois, yolk sac) & placenta & its functions</p>
UNIT/MODULE 4	<p><u>Cell Structure:</u> Ultra structure and functions of cell - Plasma membrane- Nucleus – Mitochondria- Centrosome- Ribosome - Endoplasmic reticulum- Golgi body & lysosome. Nucleus – Ultra structure & functions.</p> <p><u>Cell Division:</u> Amitosis- Mitosis- Meiosis- Significance of mitosis & meiosis- Cell cycle.</p> <p><u>Tissues:-</u> Structure, position and functions of epithelial, connective, muscular & nervous tissue.</p>

Reference books:

1. *PRINCIPLES OF ANATOMY AND PHYSIOLOGY- TORTORA,*
2. *ESSENTIALS OF ANATOMY & PHYSIOLOGY- MARTINI,*
3. *ESSENTIALS OF ANATOMY- I. SINGH*

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Paper: Basics of Biochemistry

CODE: BO104

Contact: 1L+1T

Credits: 2

Course Content	
UNIT/MODULE 1	1. Carbohydrate and its metabolic pathways :Definition, classification and functions of carbohydrate. Glycolysis, TCA cycle, Glycogenolysis, HMP shunt pathways with their significances
UNIT/MODULE 2	2. Amino acid, Protein and metabolic pathways :Amino acid- definition, classification, function, properties. Protein-definition, classification and function. Primary, secondary, tertiary, quaternary structures of protein. Non protein nitrogen. Nitrogen balance. Trans-amination and deamination. 3. Oxygen transporting protein: Structure, types, compounds, derivatives and functions of haemoglobin. Myoglobin. Oxygen transporting mechanism of haemoglobin affinity for oxygen. Bohr's effect.
UNIT/MODULE 3	4. Vitamins and antioxidants 5. Enzymes: General characteristics, classification of enzyme. Factors affecting enzyme activity. Kinetics of enzyme-k _m , Michaelis-Menten equation, Line Weaver Burk Plot. Enzyme inhibition-Reversible and Irreversible. Allosteric enzyme.
UNIT/MODULE 4	6. Hormone: Physical and chemical characteristics of hormone. types of hormone. general mechanism of hormone action. sources, functions and disorders for deficiency or excessive secretion (hypo/hyper secretions wherever applicable).

Reference books:

- 1. BIOCHEMISTRY- DEBAJYOTI DAS, BIOCHEMISTRY-U.SATYANARAYAN AND U. CHAKRAPANI**

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Paper: PROFESSIONAL COMMUNICATION IN ENGLISH

CODE: BO105

Contact: 1L+1T

Credits: 2

Course Content	
UNIT/MODULE 1	Grammar-structure of sentences etc. Essay- Descriptive-Comparative-Argumentative etc.
UNIT/MODULE 2	Drafting of email & letter writing Report writing-structure, types of reports etc.
UNIT/MODULE 3	Reading comprehension from recommended text
UNIT/MODULE 4	Biodata, Resume-curriculum vitae etc.

Reference books:

1. *COMMUNICATION (MARK MCCORMACK)*
2. *HOW TO WRITE REPORTS (JOHN METCHELL)*
3. *BUSINESS CORRESPONDENCE AND REPORT R.C. SHARMA &K.MOHAN (TATA MC GRAW, NEW DELHI 1984)*

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PRACTICAL SYLLABUS

PAPER: GEOMETRICAL OPTICS-1

P.CODE: BO-191

Contact: 2P

Credits: 2

1. Determination of the focal length & hence the power of a convex & Concave lens by displacement method.
2. Determination of the refractive index of a transparent liquid by using a travelling microscope.
3. Determination of the refractive index of the material of a convex lens measuring its focal length, using the lens & a plane mirror.
 4. Determination of refractive index of the material of a prism by minimum deviation method.
5. To draw $i-\delta$ curve of a prism by a spectrometer & hence to find out the angle of minimum deviation.

Paper: PHYSIOLOGY (General)

P.CODE: BO-192

Contact: 2P

Credits: 2

1. Identification of histological tissues: Epithelial tissue-squamous, columnar, cuboidal, Connective tissue-skeletal muscle, cardiac muscle, smooth muscle
 2. Hemoglobin estimation
 3. Determination of blood pressure
4. Determination of BT, CT, ESR
 5. Blood film making & identification of different blood corpuscle.
 6. Measurement of TC of RBC & WBC & DC of WBC.
 7. Determination of Blood Group (ABO; Rh).

Paper: EFFECTIVE COMMUNICATION

P.CODE: BO-193

Contact: 2P

Credits: 2

1. Communication-public speaking skills, features of effective speech etc.
2. Group discussions-principle-practice etc.
3. Effective Communication skills, Kul Bhushan Kumar, Khanna Publishing House

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