SYLLABUS for the
BASIC SCIENCES EXAMINATION
(OPHTHALMOLOGY)

for entry into the
MALAYSIAN UNIVERSITIES MASTERS PROGRAMME
in
OPHTHALMOLOGY

JOINTLY CONDUCTED BY
Malaysian Universities Conjoint Board of Ophthalmology
and the
College of Surgeons, Academy of Medicine of Malaysia

University of Malaya
University Kebangsaan Malaysia
University Sains Malaysia

Ministry of Health Malaysia
Academy of Medicine of Malaysia
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IMPORTANT NOTE:

1. The BASIC SCIENCES EXAMINATION (Ophthalmology) (BSE (Ophth)) for entry into the MALAYSIAN UNIVERSITIES MASTERS PROGRAMME IN OPHTHALMOLOGY will apply to the Masters (Ophthalmology) June 2007 intake. All candidates interested in applying for a place in the Masters (Ophthalmology) programme will have to sit for and obtain a pass mark in this examination. A pass in the examination will however NOT guarantee acceptance.

2. The examination will be jointly organized by the Malaysian Universities Conjoint Board of Ophthalmology and the College of Surgeons, Academy of Medicine of Malaysia.

3. The first examination will be held in September 2006. There will be two examinations yearly i.e. in March and September. Results will be released 2 weeks after the examination date. Notification of the examination dates and venue will be made approximately 6 months before. Application forms will be made available at the university ophthalmology departments and at the Academy of Medicine and will need to be submitted 2 months before the examination dates. The forms are to be submitted to the Secretariat, Academy of Medicine of Malaysia, 19, Jalan Folly Barat, 50480 Kuala Lumpur, Malaysia.

4. Results will be released in the form of grades i.e. A, B, C, D are pass marks and F is a fail.

5. This examination is a prerequisite for acceptance into the Masters Programme and this will apply to both local and international applicants.

6. An examination fee of RM300.00 payable to the “Academy of Medicine” shall apply.

7. There will be no limit to the number of times a candidate can sit for the examination. His/Her best result shall apply for consideration of acceptance to the Masters programme. The results shall be valid for a period of 3 years.
8. A candidate is eligible to sit for the examination after a minimum of 2 years post basic medical degree qualification and after successful completion of his/her housemanship. Candidates must also be registered with the Malaysian Medical Council or Medical Council of their country.

9. The examination will consist of one Multiple Choice Question (MCQ) paper with 90 questions to be answered over 3 hours. There will be negative marking of the MCQ's. Minimum marks for each question will be zero. Topics will cover the following areas:

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10. This syllabus is indicative only, and candidates may be asked about relevant topics and conditions that are not necessarily mentioned specifically in the syllabus.
1. ANATOMY

Candidates should have a knowledge of the structure and function of the head and neck and the central nervous system.

Ocular anatomy and adnexa will NOT be tested in this examination.

The cranial cavity
- Osteology of the skull including the bony orbit
- Meninges, blood supply, nerve supply
- Venous sinuses
- Foramina and their contents
- Cranial fossae
- Pituitary gland and its relations
- Trigeminal ganglion

Central nervous system
Cerebral hemispheres and cerebellum
- Surface appearance
- Internal structure
- Cortical areas
- Ventricles
- Formation and circulation of cerebrospinal fluid
- Blood supply and venous drainage
- Microscopic anatomy

Brain stem
- Midbrain
- Pons
- Medulla and fourth ventricle
- Nuclei of cranial nerves

Cranial nerves
- Origin, course and distribution

Spinal canal
- including spinal cord, venous plexus, meninges, and subarachnoid space
Specialised anatomy of visual system
- Visual pathways - visual cortex, cortical connections and association areas
- Structures involved in control of eye movements
- Autonomic nervous system and the eye

Head and neck anatomy
Specific areas to be covered include:

Nose, mouth and paranasal air sinuses
- Lateral wall of nose, septum, vessels and nerves, osteology, anatomy, relations and development of air sinuses

The face and scalp
- Muscles, nerves and vessels, temporal fossa, zygomatic arch, salivary glands and temporomandibular joint

The infratemporal fossa and pterygopalatine fossa
- Muscles, vessels, nerves, carotid sheath, pterygopalatine ganglion

General topography of the neck
- Posterior triangle, anterior triangle, suprathyroid region, prevertebral region, root of neck

Respiratory system
- The anatomy of the mouth, pharynx, soft palate and larynx with particular reference to bulbar palsy and tracheostomy

Lymphatic drainage of the head and neck
- Including face

HISTOLOGY
Knowledge of histological structure of tissue. Particular attention should be paid to the histological appearance of the structures of the head and neck especially in relation to function (see biochemistry, cell biology and physiology).

EMBRYOLOGY
General embryology with particular emphasis to structures of the head and neck.
2. PHYSIOLOGY

There will be an emphasis on normal physiology and an understanding of such fundamental surgical situations as might affect ophthalmic patients, for example, increased intracranial pressure, shock and disturbance of acid-base balance.

GENERAL PHYSIOLOGY

- Maintenance of homeostasis: osmolality, osmotic and oncotic pressure
- Transport processes in systems and tissues
- Molecular events: the role of calcium in regulation of cell processes (also, see cell biology for control and transmission of information and energy, including nucleus, mitochondria and protein synthesis)
- Normal nutritional requirements
- General metabolic response to trauma and sepsis

Nerve and muscle

- Structure and function of nerve cell
- Resting membrane potential, action potential and its propagation, synaptic potentials
- The motor unit, neuromuscular junction (including contractility - see cell biology) and molecular events
- Smooth muscle
- Pain and its control

Autonomic nervous system

Organization and anatomy, cholinergic transmission, adrenergic transmission, the adrenal medulla (also, see biochemistry and pharmacology of nervous system)

Blood

- Composition and function of blood
- Iron metabolism, erythropoeisis and anaemias
- Plasma components
- Blood groups
- Blood clotting and fibrinolysis
Respiratory system
- Respiratory mechanisms, including lung mechanics (pressure volume curves) and lung volumes and control (including neural) of ventilation
- Pulmonary blood flow, including ventilation-perfusion ratio
- \( \text{CO}_2 \) and \( \text{O}_2 \) transport, carriage, and distribution
- Gas exchange in lung
- Assessment of pulmonary function
- Respiratory failure and other common derangements of respiratory function
- Oxygen therapy and ventilatory support

Cardiovascular system
- Blood pressure
- The cardiac cycle
- Control, excitation and conduction in heart (in relation to ECG)
- Control of circulation
- Blood vessels and transcapillary exchange, measurement of blood flow
- Pathophysiology and management of shock

Acid-base balance/Metabolism
- pH-buffers - acid-base balance
- Bicarbonate/\( \text{CO}_2 \) buffer
- Disturbances of acid-base balance
- Nutrition

Renal
- Renal circulation
- Glomerular filtration
- Tubular function
- Salt and water: hormonal control (mineralocorticoids), water balance (body fluid compartments)
- Kidney in control of acid-base balance
- Renin-angiotensin system
- Disturbances of fluid and electrolyte balance
Endocrinology
- Hormones, receptors and secondary messengers
- Hypothalamic-hypophyseal system
- Steroids: adrenal cortex, synthesis of glucocorticoids and steroid hormones
- Thyroid hormones
- Calcium and phosphate homeostasis
- Carbohydrate metabolism: pancreatic hormones

Central nervous system and special senses
- Cerebrospinal fluid
- Superficial senses, proprioception, monosynaptic and polysynaptic reflexes, synaptic inhibition
- Central processing of sensory input
- Cerebellar function in motor control
- Cerebral cortex in control of movement
- Basal ganglia
- Organization within the cervical and thoracic spinal cord

3. GENETICS

- Chromosomes and cell division
- Methods of genetic analysis
- Mendelian inheritance
- X-linked inheritance
- Mitochondrial inheritance
- Linkage analysis and disequilibrium and population genetics
- Chromosome mapping
- Gene mutations
- Oncogenes, and genetics of malignancy
- Principles of gene therapy
4. MOLECULAR AND CELL BIOLOGY

Cell organelles, receptors and receptor signaling
- Plasma membrane
- Cytoskeleton and its relation to cell motility and contractility
- Nucleus
- Cell-cell communication
- Protein synthesis – pre- and post-transcriptional and translational control
- Molecular biology of protein synthesis

Receptor physiology
- Secondary messengers and intracellular signaling
- Understanding of molecular biological techniques (also in relation to genetics) including:
  - Polymerase chain reaction
  - Northern and Southern Blotting
  - In situ hybridization

Extracellular matrix
- Collagen synthesis – types and function
- Proteoglycans, glycoproteins, fibronectin, laminin and glycosaminoglycans

5. PATHOLOGY

Inflammation
- Acute inflammation: chemical and cellular mechanisms
- Wound healing
- Chronic inflammation: granulomata, granulation tissue, ulceration, immune mechanisms, chemical mediators in response to infection and tissue injury
- Graft rejection

Disturbances of growth
- Atrophy, hypertrophy, hyperplasia and metaplasia
Degenerations
- Calcification, hyaline, amyloid

Aging
- Mechanisms, including apoptosis

Neoplasia
- Morphological and cellular characteristics of benign versus malignant tumours
- Carcinogenesis:
  - Gene control
  - Oncogenes
  - Effects of irradiation and cytotoxic drugs
  - Environmental factors

Vascular disorders
- Atheroma
- Thrombosis
- Embolism
- Ischaemia and infarction
- Hypertension
- Aneurysms
- Diabetes
- Angiogenesis

Shock and trauma
- Response to surgical, chemical and radiation trauma
- Principles of the pathological effects of head injury
6. MICROBIOLOGY

Principles of infection

Culture media

Bacteria
- Gram staining and classification
- Exo- and endotoxins
- Mechanisms of virulence and pathogenicity
- Synergistic infections
- Antibiotics: including mechanisms of action, bacterial resistance
- Host defence mechanisms against bacterial infection

Viruses
- Classification
- Structure and replication
- Host defence against viral infection
- Antiviral agents
- Specific antiviral agents: mechanisms of action
- Laboratory methods for viral detection

HIV and AIDS
- Classification, diagnosis, laboratory diagnosis and monitoring of HIV infection
- Opportunistic infections
- Anti-HIV agents

Fungi
- Classification
- Host factors which predispose to fungal infection
- Antifungal agents

Others
- Toxoplasmosis
- Chlamydia
- Acanthamoeba
- Helminthic infections
- Antimicrobials
7. IMMUNOLOGY

- Innate and acquired immunity
- Effector mechanisms of immune response
- Humoral immunity and antibody class and function
- Cellular immunity
- Immunity against microbes (see microbiology)
- T and B cells: cluster differentiation, phenotype, T and B cell activation
- MHC antigens, antigen presenting cells and antigen processing
- Immune mechanisms of tissue damage
- Interleukins, complement
- Immunodeficiency (see microbiology) and immunosuppression (see pharmacology)
- Organ transplantation and pathophysiology of allograft rejection

8. PHARMACOLOGY

- Pharmacokinetics and pharmacodynamics
- Drug receptor and secondary messengers: cellular mechanisms of drug action
- Methods of drug delivery, pharmacokinetics of individual methods
- Pharmacology of:
  - Cholinergic and adrenergic systems
  - Serotonin
  - Histamine
  - Anti-inflammatory agents
  - Anti-infective agents
  - Immunosuppressants
  - Local anaesthetics
  - Analgesics
  - Mechanisms of drug toxicity
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