SYLLABUS FOR THE MEDICAL SPECIALIST PRE-ENTRANCE EXAMINATION (OPHTHALMOLOGY)

FOR ENTRY INTO THE MALAYSIAN UNIVERSITIES MASTERS PROGRAMME in OPHTHALMOLOGY

2ND EDITION

Jointly conducted by
Malaysian Universities Conjoint Committee of Ophthalmology, College of Ophthalmologists, Academy of Medicine Malaysia and the Malaysian Examinations Council

Syllabus for the
Medical Specialist Pre-Entrance Examination
(Ophthalmology)

Contents

Important Note

1. The Medical Specialist Pre-Entrance Examination (MedEx) for entry into the Malaysian Universities Master Programme in Ophthalmology applies to the Masters (Ophthalmology).

2. The examination is jointly organized by the Malaysian Universities Conjoint Committee of Ophthalmology, College of Ophthalmologists, Academy of Medicine of Malaysia and Malaysian Examinations Council.

3. There will be two examinations yearly, i.e. June and November (subject to the schedule by Malaysian Examinations Council). Results will be released within four weeks of the examination date. Notification of the examination dates and venue will be made approximately six months before. Application forms will be made available online at the Medical Specialist Pre-Entrance Examination website (http://apps.mpm.edu.my/medex/public/register). Registration will be open at five months before the examination dates.

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. A pass grade in this examination will add significantly to the credibility of candidates applying for a place in the Masters Programme of the various universities in Malaysia.

6. An examination fee of RM 800.00 payable to the Malaysian Examinations Council shall apply.

7. There will be no limit to the number of times a candidate can to sit for the examination. The candidate's best result shall apply for consideration of acceptance to the Masters programme. The results shall be valid for a period of three years.

8. A candidate is eligible to sit for the examination after a minimum of one year post basic medical degree qualification and after successful completion of his/her housemanship.

9. The examination will consist of one Multiple Choice Question (Multiple True False Question) paper with 60 questions over two hours.

10. There will be negative marking of the MCQ's. Topics will cover the following areas (with their corresponding weightings):

a)	**Anatomy**	**:**	**15 Questions**
b)	**Physiology**	**:**	**15 Questions**
c)	**Pathology**	**:**	**10 Questions**
d)	**Immunology**	**:**	**5 Questions**
e)	**Microbiology**	**:**	**5 Questions**
f)	**Pharmacology**	**:**	**5 Questions**
g)	**Genetics**	**:**	**5 Questions**

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.

Malaysian Universities Conjoint Committee of Ophthalmology
1 January 2021

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, suprahyoid region, prevertebral region, root of neck
Respiratory system
The anatomy of the mouth, pharynx, soft palate and larynx with particular reference to bulbar palsies 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 may affect ophthalmic patients, for example, increased intracranial pressure, shock and disturbance of acid-base balance.

General physiology
Maintenance of homeostasis: osmolarity, 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, erthyropoeisis and anaemia
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
CO2 and O2 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/CO2 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

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

3. 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, hyalin, 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

4. 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

5. 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 anaesthesia
Analgesia
Mechanisms of drug toxicity

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 defense mechanisms against bacterial infection

Viruses
Classification
Structure and replication
Host defense 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. 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

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