Checklist of Topics for the PHYSIOLOGY VIVA

Basic Concepts and MSK

- The Cell Membrane, Movement Across Cell Membranes
- Membrane Potentials
- Movement of Ions (e.g. Na, K)
- Synapses
- Action Potentials
- Autonomic Nervous System
- Physics of Pressure/Flow/Resistance
- Osmolality and Osmolarity
- Cell Signaling
- Muscle Fibre – Length and Tension
- Skeletal Muscle (Excitation, Contraction, Relaxation)
- Intracellular Messengers Summary

Cardiac and Haematological and Vascular

- Plasma
- Fluid Therapy (e.g. response to 1l loss or gain)
- Fluid Compartments
- Chemoreceptors and Baroreceptors
- Pacemakers
- Shock
- Autoregulation (including specific organs)
- Capillary Fluid Exchange
- Cardiac Cycle, Cardiac Bloods Flow and Cardiac Output
- Effect of training, exercise
- Conducting system of the Heart
- Control of Blood Pressure (chemical, neural)
- Venous Return Curve, CVP and JVP
- Laminar Flow
- Cerebral Blood Flow and Demands of Heart and Brain
- Wiggers Diagrams and Isovolumetric Contraction of the Heart

**Respiratory**

- Lung Volumes, Loops
- Dead Space – Anatomical And Physiological
- Oxygen Haemoglobin and CO2 Dissociation Curves
- Alveoli Stability and Alveolar gas Equations
- Control of Ventilation and Breathing
- Local and Variable Factors such as posture, VQ
- Gas Exchange (co2 and o2), Diffusion
- Bloods Gases and Compensatatory Mechanisms
- Compliance, Elastic Properties
- Surface Tension, Surfactant and Alveolar Stability
- Effects of Exercise on Respiration
- Pulmonary Circulation and Pulmonary Blood Flow
- Effects of Altitude
- Work of Breathing
- Ventilators (*more clinical than primary*)

**Neuro**

- Smooth Muscle
- Neurotransmitters
- Vestibular Function
- Sensory Pathways and the Spinal Cord
- Visual Pathways
- Stretch Reflex (see also basic concepts)
- Nerve Fibre Types and their Function
- Neuromuscular Junction
- The Spinal Cord (Cross Section)
- Conduction along a Nerve Cell
- Other Reflexes (withdrawl)
- Pain, Receptors
- RAS
- Serotonin

Renal and Endocrine, Metabolic

- Renin Angiotensin Aldosterone Axis
- How the Kidney Handles Electrolytes, Glucose & Acid-Base (CCM)
- Renal Blood Flow and its Regulation
- Factors Effecting GFR
- Buffers and Hydrogen Ion
- Production of Urine
- Glucocoarticoids, Mineralocorticoids and the Suprerenal Glands
- Adrenaline and Noradreneline
- Control of Glucose,
- ECGs and ECG/Potassium
- Metabolism of Fatty Acids and Lipids
- Metabolism of Proteins and Protein Synthesis
- Calcium, PTH and Vitamin D
- Erythropoetin and Iron

Other Topics

- Temperature Regulation
- Micturation
- Gastric Motility and Emptying
Clinical Equations

Anion Gap = (Na+K) – (Cl + Bicarbonate)

Na Deficit = (Desired Na – Measured Na) x TBW

Osmolality = 2 Na + Glucose + Urea + ETOH

Osmolar Gap = Measured - Calculated

Corrected Sodium = Na + (Glucose - 10 / 3)

AA Gradient

\[ P_{A\text{O}_2} = F_i\text{O}_2(P_{atm} - P_{H_2O}) - \frac{P_{aCO_2}}{0.8} \]

Aa Gradient = \[ (F_i\text{O}_2(P_{atm} - P_{H_2O}) - \frac{P_{aCO_2}}{0.8}) - P_e\text{O}_2 \]