



# **MEDICAL AND DENTAL COLLEGES ADMISSION TEST (MDCAT)**

## **CURRICULUM 2025**

**(Biology, Chemistry, Physics, English and Logical Reasoning)**

**(DRAFT)**

## BIOLOGY

UNIT	No.	STUDENT LEARNING OUTCOME
1- ACELLULAR LIFE	1.1	Classify viruses on basis of their structure/ number of strands/ diseases/ host etc.
	1.2	Identify symptoms, mode of transmission and cause of viral disease (AIDS).
2- BIOENERGETICS	2.1	Explain the process of photosynthesis.
	2.2	Explain the role of factors (light, water, CO <sub>2</sub> ) affecting photosynthesis.
	2.3	Explain light dependent and independent phases/reaction.
3- BIOLOGICAL MOLECULES	3.1	Define and classify biological molecules.
	3.2	Discuss the importance of biological molecules.
	3.3	Describe biologically important properties of water (polarity, hydrolysis, specific heat, water as solvent and reagent, density, cohesion/ionization).
	3.4	Discuss carbohydrates: monosaccharides (glucose), oligosaccharides (cane sugar, sucrose, lactose), polysaccharides (starches, cellulose, glycogen).
	3.5	Describe proteins: amino acids, structure of proteins.
	3.6	Describe lipids: phospholipids, triglycerides, alcohol and esters (acylglycerol).
	3.7	Give an account of RNA.
	3.8	Discuss conjugated molecules (glycol lipids, glycol proteins).
4- CELL STRUCTURE & FUNCTION	4.1	Compare the structure of typical animal and plant cell.
	4.2	Compare and contrast the structure of prokaryotic cells with eukaryotic cells.
	4.3	Outline the structure and function of the following organelles: nucleus, endoplasmic reticulum, golgi apparatus, mitochondria.
5- COORDINATION & CONTROL/ NERVOUS & CHEMICAL COORDINATION	5.1	Recognize receptors as transducers sensitive to various stimuli.
	5.2	Define neurons.
	5.3	Explain the structure of a typical neuron (cell body, dendrites, axon and myelin sheath and schwann cells).
	5.4	Define nerve impulse.
	5.5	Classify reflexes.
	5.6	Briefly explain the functions of components of a reflex arc.
	5.7	List the main parts of the brain (e.g., components of brain stem, mid brain, cerebellum, cerebrum).

My  
26/03/25

My  
26-3-25

	5.8	Describe the functions of each part of the brain.
6- DIVERSITY AMONG ANIMALS (THE KINGDOM ANIMALIA)	6.1	Describe general characteristic of animals.
7- ENZYMES	7.1	Describe the distinguishing characteristics of enzymes.
	7.2	Explain mechanism of action of enzymes.
	7.3	Describe effects of factor on enzyme action (temperature, pH, concentration).
	7.4	Describe enzyme inhibitors.
8- EVOLUTION	8.1	Explain origin of life according to concept of evolution.
	8.2	Describe the theory of inheritance of acquired characters, as proposed by Lamarck.
	8.3	Explain the theory of natural selection as proposed by Darwin.
9- PROKARYOTES (KINGDOM MONERA)	9.1	Describe cellular structures of bacteria.
	9.2	Explain diversity in shape and size in bacteria.
	9.3	Highlight the importance of bacteria and control of harmful bacteria.
10- REPRODUCTION	10.1	Describe the functions of various parts of the male & female reproductive systems and the hormones that regulate those functions.
	10.2	Describe the menstrual cycle (female reproductive cycle) emphasizing the role of hormones.
	10.3	List the common sexually transmitted diseases along with their causative agents and main symptoms.
11- SUPPORT & MOVEMENT	11.1	Define cartilage, muscle and bone.
	11.2	Explain the main characteristics of cartilage and bone along with functions.
	11.3	Compare characteristics of smooth muscles, cardiac muscles and skeletal muscles.
	11.4	Explain the ultra-structure of skeletal muscles.
	11.5	Describe in brief the process of skeletal muscle contraction.
	11.6	Classify joints.
	11.7	Define arthritis.
12- INHERITANCE	12.1	Associate inheritance with the laws of Mendel.
	12.2	Explain the law of independent assortment, using a suitable example.
	12.3	Describe the terms gene linkage and crossing over.

*Mx*  
26/03/25

*gpt*  
26.03.25

	12.4	Explain how gene linkage counters independent assortment and crossing-over modifies the progeny.
	12.5	Describe the concept of sex-linkage.
	12.6	Briefly describe Inheritance of sex-linked traits.
	12.7	Analyze the inheritance of hemophilia.
13- Form and Function in Plants	13.1	Discuss the examples of carnivorous plants (pitcher plant, venus fly trap and sundew).
	13.2	Describe osmotic pressure and its importance in plants.
	13.3	Describe water and minerals uptake by roots, xylem and phloem.
	13.4	Explain the functions of hormones naturally produced by plants.
14- Circulation	14.1	List general structure of human heart.
	14.2	Define the phases of heart beat.
	14.3	List the differences and functions of arteries, veins and capillaries.
	14.4	Describe lymphatic system (nodes, vessels and organs)
15- Immunity	15.1	Define and discuss the functions and importance of specific defense mechanisms.
16- Respiration	16.1	Discuss the functions of main part of respiratory system.
	16.2	Discuss the process of gaseous exchange in human lungs.
	16.3	List the effect of smoking on respiratory system.

*Amir*  
26/03/25

*Amir*  
26.03.25

## Chemistry

UNIT	No.	STUDENT LEARNING OUTCOME
1- INTRODUCTION OF FUNDAMENTAL CONCEPTS OF CHEMISTRY	1.1	Construct mole ratios from balanced equations for use as conversion factors in stoichiometric problems.
	1.2	Perform stoichiometric calculations with balanced equations using moles, representative particles, masses and volumes of gases (at STP).
	1.3	Explain the limiting reagent in a reaction
	1.4	Calculate the maximum number of product(s) produced and the amount of any un- reacted excess reagent.
	1.5	Given information from which any two of the following may be determined, calculate the third: theoretical yield, actual yield, percentage yield.
	1.6	Calculate the theoretical yield and the percent yield when given the balanced equation, the amounts of reactants and the actual yield
2- ATOMIC STRUCTURE	2.1	Define photon as a unit of radiation energy.
	2.2	Describe the concept of orbitals.
	2.3	Distinguish among principle energy levels, energy sub-levels, and atomic orbitals.
	2.4	Describe the general shapes of s, p, and orbitals.
	2.5	Use the Aufbau Principle, the Pauli Exclusion Principle, and Hund"s Rule to write the electronic configuration of the atoms.
	2.6	Write electronic configuration of atoms.
3-GASES	3.1	List the postulates of kinetic molecular theory.
	3.2	Describe the motion of particles of a gas according to kinetic theory.
	3.3	State the values of standard temperature and pressure (STP).
	3.4	Describe the effect of change in pressure on the volume of gas.
	3.5	Describe the effect of change in temperature on the volume of gas.
4- LIQUIDS	4.1	Describe simple properties of liquids e.g. diffusion, compression, expansion, motion of molecules, spaces between them, intermolecular forces and kinetic energy based on kinetic molecular theory.
	4.2	Explain physical properties of liquids such as evaporation, vapor pressure, boiling point.
	4.3	Describe the hydrogen bonding in H <sub>2</sub> O, NH <sub>3</sub> and HF molecules.
	4.4	Anomalous behavior of water when its density shows maximum at 4 degree centigrade
5- SOLIDS	5.1	Describe crystal line solids.
	5.2	Name three factors that affect the shape of an ionic crystal.
	5.3	Give a brief description of ionic and molecular solids.

Mr  
26/03/25

Mr  
26.03-25

	5.4	Describe crystal lattice.
	5.5	Define lattice energy.
6- CHEMICAL EQUILIBRIUM (6.6 and 6.7 from Acid-Base and Salt Unit)	6.1	Define chemical equilibrium in terms of a reversible reaction.
	6.2	Write both forward and reverse reactions and describe their macroscopic characteristics of each.
	6.3	State Le Chatelier's Principle and be able to apply it to systems in equilibrium with changes in concentration, pressure, temperature, or the addition of catalyst.
	6.4	Define and explain solubility product.
	6.5	Define and explain the common ion effect by giving suitable examples.
	6.6	Describe buffer solutions and explain types of buffers.
	6.7	Explain synthesis of ammonia by Haber's Process.
7- REACTION KINETICS	7.1	Define chemical kinetics.
	7.2	Explain the terms rate of reaction, rate equation, order of reaction, rate constant and rate determining step.
	7.3	Explain qualitatively factors affecting rate of reaction.
	7.4	Given the order with respect to each reactant, write the rate law for the reaction.
	7.5	Explain the meaning of the terms „activation energy“ and activated complex“.
	7.6	Relate the ideas of activation energy and the activated complex to the rate of a reaction.
	7.7	Explain effects of concentration, temperature and surface area on reaction rates.
	7.8	Describe the role of the rate constant in the theoretical determination of reaction rate.
8- THERMOCHEMISTRY & ENERGETICS OF CHEMICAL REACTIONS	8.1	Define thermodynamics.
	8.2	Classify reactions as exothermic or endothermic.
	8.3	Define the terms system, surrounding, boundary, state function, heat, heat capacity, internal energy, work done and enthalpy of a substance.
	8.4	Name and define the units of thermal energy.
	8.5	Explain the first law of thermodynamics for energy conservation.
	8.6	Apply Hess's Law to construct simple energy cycles.
	8.7	Describe enthalpy of a reaction.
9- ELECTROCHEMISTRY	9.1	Give the characteristics of a redox reaction.

*MW*  
26/03/25

*gfy*  
26.03.25

	9.2	Define oxidation and reduction in terms of a change in oxidation number.
	9.3	Use the oxidation-number change method to identify atoms being oxidized or reduced in redox reactions.
	9.4	Define cathode, anode, electrode potential and S.H.E (Standard Hydrogen Electrode).
	9.5	Use the ion-electron method/oxidation number method to balance chemical equations.
10- CHEMICAL BONDING	10.1	Use VSEPR theory to describe the shapes of molecules.
	10.2	Describe the features of sigma and pi bonds.
	10.3	Describe the shapes of simple molecules using orbital hybridization.
	10.4	Determine the shapes of some molecules from the number of bonded pairs and
	10.5	Predict the molecular polarity from the shapes of molecules.
	10.6	Explain what is meant by the term ionic character of a covalent bond.
	10.7	Describe how knowledge of molecular polarity can be used to explain some physical and chemical properties of molecules.
	10.8	Define bond energies and explain how they can be used to compare bonds strengths of different chemical bonds.
	10.9	Define and explain the terms atomic radii, ionic radii, covalent radii, ionization energy, electron affinity, electro negativity, bond energy and bond length.
11- S AND P BLOCK ELEMENTS	11.1	Recognize the demarcation of the periodic table into s block, p block, d block, and f block.
	11.2	Describe how physical properties like atomic radius, ionization energy, electro negativity, electrical conductivity and melting and boiling points of elements change within a group and within a period in the periodic table.
	11.3	Describe reactions of Group I elements with water, oxygen and chlorine.
	11.4	Describe reactions of Group II elements with water, oxygen and nitrogen.
	11.5	Describe reactions of Group IV elements.
12- TRANSITION ELEMENTS		
13- FUNDAMENTAL PRINCIPLES OF ORGANIC CHEMISTRY	13.1	Define organic chemistry and organic compounds.
	13.2	Classify organic compounds on structural basis.
	13.3	Define functional group.
	13.4	Explain stereoisomerism and its types.
14- CHEMISTRY OF HYDROCARBONS	14.1	Classify hydrocarbons as aliphatic and aromatic.
	14.2	Describe nomenclature of alkanes.

*Amir*  
26/03/25

*Amir*  
26.03.25