

SYLLABUS ... MDCAT PREPARATORY CLASSES- 2025

Date & Day	Lecture #	BIOLOGY	CHEMISTRY
16 Jun 25 Monday	1	UNIT 3..... Biological Molecules 3.1... Define and classify biological molecules 3.2 ...Discuss the importance of biological molecules 3.3... Discuss the biologically important properties of water 3.4... Discuss monosaccharides (glucose), disaccharides (sucrose, lactose, maltose)	1. Introduction to Fundamental Concepts of Chemistry: Moles & Avogadro's number, Limiting & excess reactants, Yield
17 Jun 25 Tuesday	2	UNIT 3..... Biological Molecules 3.4... Discuss polysaccharides (starch, cellulose & glycogen) 3.5... Describe proteins: amino acids and structure of proteins and glycoproteins)	2. Atomic Structure: Discovery of proton, Plank's Quantum theory, Quantum numbers, Shapes of orbitals, Spectrum of hydrogen, Electronic configuration
18 Jun 25 Wednesday	3	UNIT 3..... Biological Molecules 3.6 ...Describe lipids: phospholipids, triglycerides, acyl glycerols (alcohol and esters) 3.7... Discuss structure and function of RNA 3.8... Discuss conjugated molecules (glycolipids)	6. Chemical Equilibrium: Chemical equilibrium, Le-Chatelier's principle, Haber's process
19 Jun 25 Thursday	4	UNIT 3..... Biological Molecules 3.9... Discuss the Watson and Crick model of DNA 3.10.. Define gene as a sequence of nucleotides and as part of DNA, which codes for the formation of a polypeptide	6. Chemical Equilibrium: Solubility product, Common ion effect, Buffer solution
20 Jun 25 Juma	5	UNIT 4 ... Cell Structure & Function 4.1... Comparison of structure of typical animal & plant cells 4.2 ...Comparison of structure of prokaryotes & eukaryotes 4.3... Discussion of the structure and functions of nucleus	7. Reaction Kinetics: Chemical kinetics, Factors affecting rate of reaction
21 Jun 25 Saturday	6	UNIT 4 ... Cell Structure & Function 4.3... Discussion of the structure and functions of endoplasmic reticulum Golgi apparatus and mitochondria 4.4... Discussion of the structure, chemical composition and functions of chromosomes	7. Reaction Kinetics: Order of reaction, Rate constant
23 Jun 25 Monday	7	UNIT 2 ... Bioenergetics 2.1 ... Outline the cellular respiration of proteins and fats and correlate these with that of glucose	3. Gases: Kinetic molecular theory, Standard temperature and pressure (STP), Boyle's Law, Charles's Law, Absolute Zero, Ideal gas equation, Unit of "R", Real and ideal gas
24 Jun 25 Tuesday	8	UNIT 2 ... Bioenergetics 2.1...Complete	8. Thermochemistry and Energetics of Chemical Reaction: Thermodynamics, Exothermic and endothermic reaction, Different terms used, Internal energies

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25 Jun 25 Wednesday	9	UNIT 1..... Acellular Life 1.1... Classify viruses on the basis of structure, number of strands, diseases caused or hosts 1.2 ...Identify symptoms, mode of transmission and cause of viral disease AIDS	8. Thermochemistry and Energetics of Chemical Reaction: Laws of Thermodynamics, Hess's Law, Enthalpy
26 Jun 25 Thursday	10	UNIT 8..... Reproduction 8.1... Describe the functions of various parts of male & female reproductive systems and the hormones that regulate those functions 8.2 ...Describe the menstrual cycle (female reproductive cycle) emphasizing the role of hormones	4. Liquids: Properties of liquids based on Kinetic molecular theory, Evaporation, Boiling point, Vapour pressure, Hydrogen bonding, Anomalous behaviour of water
27 Jun 25 Juma	11	UNIT 8..... Reproduction 8.2 ... complete 8.3. List the common sexually transmitted diseases along with their causative agents and main symptoms	5. Solids: Crystalline solids, Factors affecting the shape of ionic crystals, Difference between ionic and molecular crystals, Crystal lattice, Lattice energy
28 Jun 25 Saturday	12	UNIT 6..... Enzymes 6.1 ... Describe the distinguishing characteristics of enzymes 6.2 ... Explain mechanism of action of enzymes 6.3 ... Describe the effects of factor on enzyme action (temperature, pH and concentration) 6.4 ... Describe enzyme inhibitors	9. Electrochemistry: Redox reaction, Oxidation and reduction, Balancing chemical reaction, Standard hydrogen electrode SHE
30 Jun 25 Monday	13	UNIT 10..... Inheritance 10.1.. Associate inheritance with the laws of Mendel. 10.2.. Explain law of independent assortment, using an example	10. Chemical Bonding: VSEPR Theory, Application of VSEPR Theory Sigma and Pi Bond
01 Jul 25 Tuesday	14	UNIT 10..... Inheritance 10.3. Describe the terms gene linkage and crossing over 10.4. Explain how gene linkage counters independent assortment and crossing-over modifies the progeny	10. Chemical Bonding: Hybridization, Dipole Movement, Application of Dipole Movement, Bond Energy
02 Jul 25 Wednesday	15	UNIT 10..... Inheritance 10.5..Describe the concept of sex-linkage. 10.6.. Briefly describe Inheritance of sex –linked traits 10.7.. Analyze the inheritance of hemophilia	11. s and p - Block Elements: Properties and their Trends, s-, p-, d- & f- Block Elements
03 Jul 25 Thursday	16	UNIT 11..... Circulation 11.1. Discuss general structure of human heart 11.2. Describe the phases of heartbeat. 11.3. List the differences and functions of arteries, veins & capillaries	11. s and p - Block Elements: Reactions of Group I elements, Reactions of Group II elements, Reactions of Group IV elements

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10 Jul 25 Thursday	17	Unit 11..... Circulation 11.4. Describe lymphatic system (nodes, vessels and organs)	12. Transition Elements: Electronic Structure
11 Jul 25 Juma	18	Unit 5..... Coordination & Control 5.1. Recognize receptors as transducers sensitive to various stimuli 5.2. Explain the structure of a typical neuron (cell body, dendrites, axon and myelin sheath) 5.3. Define nerve impulse	13. Fundamental Principles of Organic Chemistry: Definition and Classification of Organic Compounds, Functional Group
12 Jul 25 Saturday	19	Unit 5..... Coordination & Control 5.4. Classify reflexes 5.5. Briefly explain the functions of components of a reflex arc 5.6. Discuss the main parts of the brain (e.g., components of brain stem, mid brain, cerebellum, cerebrum) 5.7. Describe the functions of each part	13. Fundamental Principles of Organic Chemistry: Isomerism
14 Jun 25 Monday	20	Unit 12..... Immunity 12.1. Define and discuss the functions and importance of specific defense mechanisms	14. Chemistry of Hydrocarbons: Nomenclature of Alkanes, Free Radical Mechanism, Nomenclature of Alkenes, Shapes of Alkenes, Structure and Reactivity of Alkenes, Preparation of Alkanes, IUPAC System of Alkynes, Preparation of Alkynes, Acidity of Alkynes, Reactions of Alkynes
15 Jun 25 Tuesday	21	Unit 14..... Digestion 14.1. Describe the parts of human digestive system 14.2. Explain the functions of the main parts of the digestive system including associated structures and glands	14. Chemistry of Hydrocarbons: MOT of Benzene, Resonance and Resonance Energy, Reactivity of Benzene, Chemical Reactions of Benzenes, Effects of substituents, Substitution vs Addition
16 Jul 25 Wednesday	22	Unit 14..... Digestion 14.2. Explain the functions of the main parts of the digestive system including associated structures and glands	15. Alkyl Halides: Nomenclature, Structure and Reactivity, Mechanism and types of nucleophilic substitution reactions, Mechanism and types of elimination reactions, Substitution vs Elimination
17 Jul 25 Thursday	23	Unit 7..... Evolution 7.1. Explain origin of life according to concept of evolution 7.2. Describe the theory of inheritance of acquired characters, as proposed by Lamarck. 7.3. Explain the theory of natural selection as proposed by Darwin	17. Aldehydes and Ketones: Nomenclature and structure of Aldehydes and Ketones, Preparation, Reactivity of Aldehydes and Ketones
18 Jul 25 Juma	24	Unit 15..... Excretion 15.1. Explain different organs of urinary system. Describe the structure of kidney and relate it with its function 15.2. Explain the steps of urine formation 15.3. Justify the functioning of kidneys as both excretion and osmoregulation	17. Aldehydes and Ketones: Reactions of Aldehydes and Ketones

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19 Jul 25 Saturday	25	Unit 15..... Excretion 15.4. Compare the function of two major capillary beds in kidney i.e. glomerular capillaries and peritubular capillaries. 15.5. Explain the causes and treatments of kidney stones. 15.6. Outline the causes of kidney failure. 15.7. Describe thermoregulation and explain its needs. 15.8. List various nitrogenous compounds excreted during the process of excretion	16. Alcohols and Phenols: Nomenclature, structure and reactivity of Alcohols
21 Jul 25 Monday	26	Unit 13..... Respiration 13.1. Discuss the functions of main part of respiratory system 13.2. Discuss the process of gas exchange in human lungs 13.3. Discuss the effect of smoking on respiratory system	16. Alcohols and Phenols: Nomenclature, structure and reactivity of Phenols, Difference between Alcohols and Phenols
22 Jul 25 Tuesday	27	Unit 9..... Support & Movement 9.1. Describe cartilage, muscle and bone 9.2. Explain the main characteristics of cartilage and bone along with functions. 9.3. Compare characteristics of smooth muscles, cardiac muscles and skeletal muscles 9.4. Explain the ultra-structure of skeletal muscles	18. Carboxylic Acids: Nomenclature, Structure and Preparation of Carboxylic Acids, Chemical Reactions/Reactivity, Conversion of Carboxylic Acid
23 Jul 25 Wednesday	28	Unit 9..... Support & Movement 9.5. Describe in brief the process of skeletal muscle contraction 9.6. Classify joints 9.7. Define arthritis	19. Macromolecules: Classification of Proteins, Importance of Proteins, Enzymes as Biocatalyst
24 Jul 25 Thursday	29	Unit 16..... Biotechnology 16.1. Describe how biotechnologists can combat health problems by producing vaccines. 16.2. State the role played by biotechnology in disease diagnosis (DNA/RNA probes, monoclonal antibodies) 16.3. Describe what products biotechnologists obtain for use in disease treatment	20. Industrial Chemistry: Adhesive, Dyes, Polymers

Date & Day	Lecture #	PHYSICS	English / Logical Reasoning
16 Jun 25 Monday	1	ADDITION OF VECTORS (Rectangular Components) 1.1 Determine the sum of vectors using perpendicular Components	Sentence Structures
17 Jun 25 Tuesday	2	PRODUCT OF VECTORS (Scalar Product) 1.2 Describe Scalar Product of two vectors in term of angle between them Product of Vectors (Vector Product) 1.3 Describe Vector product of two vectors in terms of angle between them.	Faulty Sentence Structures
18 Jun 25 Wednesday	3	DISPLACEMENT 2.1. Describe displacement. Velocity 2.2. Describe average velocity of objects. Displacement-time Graph 2.3. Interpret displacement-time graph of objects moving along the same straight line. Acceleration 2.4. Describe acceleration Uniform and variable acceleration 2.5. Distinguish between uniform and variable acceleration. Newton's Laws of motion 2.12. Apply Newton's laws to explain the motion of objects in a variety of context. Newton's Second Law and Linear momentum 2.13. Describe the Newton's second law of motion as rate of change of momentum Newton's third law of motion 2.14. Correlate Newton's third law of motion and conservation of momentum.	Sentence Analysis
19 Jun 25 Thursday	4	PROJECTILE MOTION 2.6. Explain that projectile motion is two-dimensional motion in a vertical plane. Ideal Projectile 2.7. Communicate the ideas of a projectile in the absence of air resistance. Projectile motion (Velocity) 2.8. Explain Horizontal component (V _H) of velocity is constant. 2.9. Acceleration is in the vertical direction and is the same as that of a vertically free- falling object. 2.10. Differentiate between the characteristics of horizontal motion and vertical motion Projectile motion: Maximum Height Range Time of flight Maximum angle 2.11. Evaluate, using equations of uniformly accelerated motion for a given initial velocity of frictionless projectile, the following issues: a. How much higher does it go? b. How far would it go along the level land? c. Where would it be after a given time? d. How long will it remain in air? e. Determine the parameters for a projectile launched from ground height f. Launch angle that results in the maximum range g. Relation between the launch angles that result in the same range. COLLISION	Sentence Inversion for Various Purposes

		<p>2.15. Solve different problems of elastic and inelastic collisions between two bodies in one dimension by using law of conservation of momentum. Momentum and Explosive forces</p> <p>2.16. Describe that momentum is conservational situations. Perfectly elastic collision in one dimension</p> <p>2.17. Identify that for a perfectly elastic collision, the relative speed of approach is equal to the relative speed of separation</p>	
20 Jun 25 Juma	5	<p>WORK</p> <p>3.1. Describe the concept of work in terms of the product of force F and displacement d in the direction of force Energy</p> <p>3.2. Describe energy Kinetic Energy</p> <p>3.3. Explain kinetic energy Potential energy</p> <p>3.4. Explain the difference between potential energy and gravitational potential energy.</p>	Varying Positions of Adverbs
21 Jun 25 Saturday	6	<p>ABSOLUTE POTENTIAL ENERGY</p> <p>3.5. Describe that the gravitational potential energy is measured from a reference level and can be positive or negative, to denote the orientation from the reference levels. Power</p> <p>3.6. Express power as scalar product of force and velocity. Work energy theorem in resistive medium</p> <p>3.7. Explain that work done against friction is dissipated as heat in the environment. Implications of energy losses in practical devices and Efficiency</p> <p>3.8. State the implications of energy losses in practical devices</p>	Introduction & brief description of all categories with examples in logical reasoning section (LR)
23 Jun 25 Monday	7	<p>ANGULAR DISPLACEMENT</p> <p>4.1. Define angular displacement, express angular displacement in radians.</p> <p>4.2. Define revolution, degree and radian Angular Velocity</p> <p>4.3. Describe the term angular velocity</p>	Active & Passive Voice
24 Jun 25 Tuesday	8	<p>RELATION BETWEEN ANGULAR AND LINEAR QUANTITIES</p> <p>4.4. Find out the relationship between the following:</p> <ol style="list-style-type: none"> Relation between linear and angular variables Relation between linear and angular displacements Relation between linear and angular velocities Relation between linear and angular accelerations 	Direct & Indirect Narration
25 Jun 25 Wednesday	9	<p>TERMINAL VELOCITY</p> <p>5.1. Describe the terminal velocity of an object. Fluid Drag</p> <p>5.2. Define and explain the term fluid drag.</p> <p>FLUID FLOW</p> <p>5.3. Define the terms: Steady (Streamline or laminar) flow, Incompressible flow and non-viscous flow as applied to the motion of an ideal fluid.</p> <p>5.4. Explain that at the sufficiently high velocity, the flow of viscous fluid undergoes a transition from laminar to turbulence conditions.</p> <p>5.5. Describe that majority of practical examples of fluid flow and resistance to motion in fluid involve turbulent rather than laminar conditions</p>	The Use of Tenses

26 Jun 25 Thursday	10	<p>EQUATION OF CONTINUITY</p> <p>5.6. Describe equation of continuity $A_v = \text{constant}$ for the flow of an ideal and incompressible fluid and solve problems using it.</p> <p>5.7. Identify that the equation of continuity is the form of principle of conservation of mass.</p> <p>BERNOULLI'S EQUATION</p> <p>5.8. Interpret and apply Bernoulli's effect in Blood physics.</p> <p>5.9. Derive Bernoulli's equation for the case of horizontal tube of flow</p> <p>5.10. Describe the pressure difference can arise from different rates of flow of fluid (Bernoulli's effect).</p>	Pronoun – Antecedent Agreement
27 Jun 25 Juma	11	<p>MOTION OF WAVE</p> <p>6.1. Describe the meaning of wave motion as illustrated by vibrations in ropes and springs.</p> <p>Progressive waves</p> <p>6.2. Demonstrate that mechanical waves require a medium for their propagation while electromagnetic waves do not. Characteristics of wave</p> <p>6.3. Define and apply the following terms to the wave model; medium, displacement, amplitude, period, compression, rarefaction, crest, trough, wavelength, velocity. Wave Speed</p> <p>6.4. Solve problems using the equation: $v = f\lambda$. Progressive waves</p> <p>6.5. Describe that energy is transferred due to a progressive wave. Classification of progressive waves</p> <p>6.6. Compare transverse and longitudinal waves.</p> <p>Speed of sound Newton's Formula for speed of sound in air</p> <p>6.7. Explain that speed of sound depends on the properties of medium in which it propagates and describe Newton's formula of speed of waves. Laplace's Correction</p> <p>6.8. Describe the Laplace correction in Newton's formula for speed of sound in air. Effect of various factors on speed of sound</p> <p>6.9. Identify the factors on which speed of sound in air depends.</p>	Subject – Verb Agreement
28 Jun 25 Saturday	12	<p>SUPERPOSITION OF WAVES</p> <p>6.10. Describe the principle of super position of two waves from coherent sources.</p> <p>Interference of sound waves</p> <p>6.11. Describe the phenomenon of interference of sound waves. Stationary waves</p> <p>6.12. Explain the formation of stationary waves using graphical method</p> <p>6.13. Define the terms, node and antinodes. Stationary waves in a stretched string</p> <p>6.14. Describe modes of vibration of strings. Organ pipes</p> <p>6.15. Describe formation of stationary waves in vibrating air columns. Superposition of waves</p> <p>6.16. Explain the principle of Superposition Simple Harmonic Motion, Terminologies of SHM, Circular motion and SHM, Energy</p> <p>6.17. Explain Simple Harmonic Motion (S.H.M) and explain the characteristics of S.H.M. (Chapter: Oscillation) Circular Motion and SHM (Acceleration and Velocity of Projection)</p> <p>6.18 Describe that when an object moves in a circle, the motion of its projection on the diameter of a circle is SHM.</p>	Direction Sense & Critical Thinking (LR)

30 Jun 25 Monday	13	<p>THERMAL EQUILIBRIUM, HEAT</p> <p>7.1. Describe that thermal energies transferred from a region of higher temperature to a region of lower temperature. Molar specific heat of gas</p> <p>7.2. Differentiate between specific heat and molar specific heat. Work 7.3. Calculate work done by a thermodynamic system during a volume change</p>	Infinitive and Infinitive Phrases
01 Jul 25 Tuesday	14	<p>FIRST LAW OF THERMODYNAMICS</p> <p>7.4. Describe the first law of thermodynamics expressed in terms of the change in internal energy, the heating of the system and work done on the system.</p> <p>7.5. Explain that first law of thermodynamics expresses the conservation of energy. Molar specific heat of gas</p> <p>7.6. Define the terms, specific heat and molar specific heats of a gas. Relation between molar specific heat at constant volume and constant pressure</p> <p>7.7. Apply the first law of thermodynamics to derive the relation $C_p - C_v = RC$ for an ideal gas</p>	Gerund and Gerund Phrases
02 Jul 25 Wednesday	15	<p>COULOMB'S LAW</p> <p>8.1. State Coulomb's law and explain that force between two-point charges is reduced in a medium other than free space using Coulomb's law Electric Field</p> <p>8.2. Describe the concept of an electric field as an example of a field of force. Electric field intensity due to a point charge Representation of electric field by lines</p> <p>8.3. Calculate the magnitude and direction of the electric field at a point due to two charges with the same or opposite signs</p> <p>8.4. Sketch the electric field lines for two-point charges of equal magnitude with same or opposite signs Electric field intensity due to an infinite sheet of charges</p> <p>8.5. Describe and draw the electric field due to an infinite size conducting plate of positive or negative charge</p>	Figures of Speech
03 Jul 25 Thursday	16	<p>ELECTRIC POTENTIAL ENERGY AND POTENTIAL DUE TO A POINT CHARGE</p> <p>8.6 Define electric potential at a point in terms of the work done in bringing Unit positive charge from infinity to that point Electric potential 8.7. Define the Unit of potential Electric potential energy and potential due to a point charge</p> <p>8.8. Derive an expression for electric potential at a point due to a point charge Charging and discharging of a capacitor through a resistance</p> <p>8.9. Demonstrate charging and discharging of a capacitor through a resistance</p>	Syllogism (LR)

10 Jul 25 Thursday	17	<p>STEADY CURRENT</p> <p>9.1. Describe the concept of steady current. Ohm's Law</p> <p>9.2. State Ohm's law. Factors on which resistance depends Temperature coefficient of resistivity</p> <p>9.3. Define resistivity and explain its dependence upon temperature.</p>	Reading Comprehension – 1 Letter & Symbol Series (LR)
11 Jul 25 Juma	18	<p>INTERNAL RESISTANCE OF SOURCES</p> <p>9.4. Explain the internal resistance of sources and its consequences for external circuits. Maximum power Output</p> <p>9.5. Describe the conditions for maximum power transfer.</p>	Reading Comprehension - 2
12 Jul 25 Saturday	19	<p>MAGNETIC FLUX DENSITY/MAGNETIC FIELD</p> <p>10.1. Define magnetic flux density and its Units. Magnetic flux</p> <p>10.2. Describe the concept of magnetic flux Φ (Phi) as scalar product of magnetic field(B) and area(A) using the relation $\Phi B = B \perp A = B.A$</p>	Coding & De-coding (LR)
14 Jul 25 Monday	20	<p>MOTION OF CHARGED PARTICLE IN MAGNETIC FIELD</p> <p>10.3. Describe quantitatively the path followed by a charged particle into a magnetic field in a direction perpendicular to the field.</p> <p>10.4. Explain that a force may act on a charged particle in a uniform magnetic field.</p>	Punctuation Marks
15 Jul 25 Tuesday	21	<p>FARADAY'S LAW OF ELECTROMAGNETIC INDUCTION</p> <p>11.1. State Faraday's law of electromagnetic induction.</p> <p>Lenz's Law</p> <p>11.2. Account for Lenz's law to predict the direction of an induced current and relate to the principle of conservation of energy</p>	Transitional Devices
16 Jul 25 Wednesday	22	<p>TRANSFORMER</p> <p>11.3. Describe the construction of a transformer and explain how it works.</p> <p>11.4. Describe how set-up and step-down transformers can be used to ensure efficient transfer of electricity along cables.</p>	Errors of Usage
17 Jul 25 Thursday	23	<p>PHASE OF ALTERNATING CURRENT</p> <p>12.1. Describe the phase of Alternating Current and explain how phase lag and phase lead occur in AC circuits AC through a. Resistor b. Capacitor. c. Inductor</p> <p>12.2. Explain the flow of AC through resistors, Capacitors and Inductor Electromagnetic waves</p> <p>12.3 Become familiar with EM spectrum (ranging from radio waves to Gamma rays)</p>	Errors of Functions & Spelling
18 Jul 25 Juma	24	<p>RECTIFICATION</p> <p>13.1. Define rectification and describe the use of diodes for half and full wave rectifications. PN Junction</p> <p>13.2 Describe the PN Junction and discuss its forward and reverse biasing</p>	Prepositions
19 Jul 25 Saturday	25	<p>QUANTUM THEORY AND RADIATION</p> <p>14.1. Explain the particle model of light in terms of photons with energy</p>	Cause & Effect Problems (LR)

21 Jul 25 Monday	26	QUANTUM THEORY AND RADIATION 14.1. Explain the particle model of light in terms of photons with energy	Word Meanings
22 Jul 25 Tuesday	27	ATOMIC SPECTRA 15.1. Describe and explain atomic spectra/ line spectrum	Synonyms - 1
23 Jul 25 Wednesday	28	COMPOSITION OF ATOMIC NUCLEI 16.1. Describe a simple model for the atom to include protons, neutrons and electrons Spontaneous and random nuclear decay 16.2. Identify the spontaneous and random nature of nuclear decay.	Synonyms - 2
24 Jul 25 Thursday	29	HALF-LIFE AND RATE OF DECAY 16.3. Describe the term half-life and solve problems using the equation $\lambda = 0.693 / T_{1/2}$. BIOLOGICAL AND MEDICAL USES OF RADIATION 16.4. Describe biological effects of radiation state and explain the different medical uses of radiation.	Course of Action Problems (LR)