

IIT JAM - BI SYLLABUS

JAM-BIOLOGICAL SCIENCES (BI)

GENERAL BIOLOGY : Taxonomy of plants and animals; pro-and eukaryotic organisms; cell organelles and their function; multicellular organization; general physiology; energy transformations; internal transport systems of plants and animals; photosynthesis; respiration; regulation of body fluids and excretory mechanisms; reproductive biology; plant and animal hormones and their action; nervous systems; animal behavior; plant and animal diseases; Mendelian genetics and heredity; basics of developmental biology; biology of populations and communities; evolution; basic principles of ecology; genesis and diversity of organisms.

BASICS OF BIOCHEM, MOLECULAR BIOLOGY, BIOPHYSICS : Buffers; trace elements in biological systems; enzymes and proteins; vitamins; biological oxidations, photosynthesis; carbohydrates and lipids and their metabolism; digestion and absorption; detoxifying mechanisms; nucleic acids; nucleic acid metabolism; nature of gene and its function; genetic code; synthesis of nucleic acids and proteins; regulation of gene expression; operons. Structure of biomolecules; intra and intermolecular forces; thermodynamics and kinetics of biological systems; enzyme mechanisms and kinetics; principles of X-ray diffraction; IR- and UV- spectroscopy; analytical and biochemical techniques

MICROBIOLOGY, CELL BIOLOGY AND IMMUNOLOGY : Classification of microorganisms and their characterization; nutrient requirement for growth; laboratory techniques in microbiology; pathogenic microorganisms and disease; applied microbiology; viruses and fungi; microbial genetics; cell theory; cell architecture; cell division; types of chromosome structure; biochemical genetics- inborn errors of metabolisms; innate and adaptive immunity, antigen antibodies; principles of processes of development.

MATHEMATICAL SCIENCES: Mathematical functions (algebraic, exponential, trigonometric) and their derivatives (derivatives & integrals of simple functions); permutations & combinations; basic probability and volumetric calculations.



JAM-BIOTECHNOLOGY (BT)

The Biotechnology (BT) test paper comprises of Biology, Chemistry, Mathematics and Physics. Questions from Biological and Chemistry Section will be of Graduation level. Students should have concepts of Mathematics and Physics at least up to 10+2 level.

BIOLOGY (10+2+3 level)**General Biology:**

Taxonomy; Heredity; Genetic variation; Conservation; Principles of ecology; Evolution; Techniques in modern biology.

Biochemistry & Physiology:

Carbohydrates; Proteins; Lipids; Nucleic acids; Enzymes; Vitamins; Hormones; Metabolism - Glycolysis, TCA cycle, Oxidative Phosphorylation; Photosynthesis. Nitrogen Fixation, Fertilization and Osmoregulation; Vertebrates-Nervous system; Endocrine system; Vascular system; Immune system; Digestive system and Reproductive System.

Basic Biotech:

Tissue culture; Application of enzymes; Antigen-antibody interaction; Antibody production; Diagnostic aids.

Molecular Biology:

DNA; RNA; Replication; Transcription; Translation; Proteins; Lipids and Membranes; Operon model; Gene transfer.

Cell Biology:

Cell cycle; Cytoskeletal elements; Mitochondria; Endoplasmic reticulum; Chloroplast; Golgi apparatus; Signaling.

Microbiology:

Isolation; Cultivation; Structural features of virus; Bacteria; Fungi; Protozoa; Pathogenic micro-organisms.

CHEMISTRY (10+2+3 level)

Atomic Structure: Bohr's theory and Schrodinger wave equation; Periodicity in properties; Chemical bonding; Properties of s, p, d and f block elements; Complex formation; Coordination compounds; Chemical equilibria; Chemical thermodynamics (first and second law); Chemical kinetics (zero, first, second and third order reactions); Photochemistry; Electrochemistry; Acid-base concepts; Stereochemistry of carbon compounds; Inductive, electromeric, conjugative effects and resonance; Chemistry of Functional Groups: Hydrocarbons, alkyl halides, alcohols, aldehydes, ketones, carboxylic acids, amines and their derivatives; Aromatic hydrocarbons, halides, nitro and amino compounds, phenols, diazonium salts, carboxylic and sulphonic acids; Mechanism of organic reactions; Soaps and detergents; Synthetic polymers; Biomolecules - amino acids, proteins, nucleic acids, lipids and carbohydrates (polysaccharides); Instrumental techniques - chromatography (TLC, HPLC), electrophoresis, UV-Vis, IR and NMR spectroscopy, mass spectrometry.

MATHEMATICS (10+2 level)

Sets, Relations and Functions, Mathematical Induction, Logarithms, Complex numbers, Linear and Quadratic equations, Sequences and Series, Trigonometry, Cartesian System of Rectangular Coordinates, Straight lines and Family, Circles, Conic Sections, Permutations and Combinations, Binomial Theorem, Exponential and Logarithmic Series, Mathematical Logic, Statistics, Three Dimensional Geometry, Vectors, Matrices and Determinants, Boolean Algebra, Probability, Functions, limits and Continuity, Differentiation, Application of Derivatives, Definite and Indefinite Integrals, Differential Equations.

PHYSICS (10+2 level)

Physical World and Measurement, Elementary Statics and Dynamics, Kinematics, Laws of Motion, Work, Energy and Power, Electrostatics, Current electricity, Magnetic Effects of Current and Magnetism, Electromagnetic Induction and Alternating Current, Electromagnetic waves, Optics, Dual Nature of Matter and Radiations, Atomic Nucleus, Solids and Semiconductor Devices, Principles of Communication, Motion of System of Particles and Rigid Body, Gravitation, Mechanics of Solids and Fluids, Heat and Thermodynamics, Oscillations, Waves.

TOPICWISE MARK DISTRIBUTION AS PER PRVIOUS YEAR QUESTION ANALYSIS

Sr. No.	Topic	Topic wise MARKS
1	Biochemistry	8-10 = 16-20 MARKS
2	Cell biology	5-7 = 10-14 MARKS
3	Mol. Bio	4-5 = 8-10 MARKS
4	Immunology	3-4 = 6-8 MARKS
5	Dev. Bio	1-2 = 2-4 MARKS
6	Plant Physiology	2-3 = 4-6 MARKS
7	Animal Physiology	3-4 = 6-8 MARKS
8	Genetics	4-5 = 8-9MARKS
9	Biodiversity & Tax	0-2 = 0-4 MARKS
10	Ecology	1-2 = 2-4 MARKS
11	Evolution and A B	2-3 = 4-6 MARKS
12 & 13	TECHNIQUES- RDT, IT, BIOINFROMATICS, PTC, ATC, IMMUNOTECHNIQUES, MOL TECHNIQUES AND ALL	4-5 = 8-10MARKS
14	MICROBIOLOGY	4-5 = 8-10 MARKS

QUALIFYING AVERAGE CUTOFF AS PER PRVIOUS EXAMINATIONS

Category	IIT JAM
General/ EWS/ OBC	25-40 MARKS OUT OF 100 OR 25 TO 40 %
SC/ST	20-35 MARKS OUT OF 100 OR 20 TO 35 %

LIST OF STANDARD REFERENCE BOOKS FOR PREPARATION OF EXAMINATIONS

SR. NO.	NAME OF REFERENCE BOOK	CHAPTER
1	Campbell Biology	Basics and unit 10/11/7/9
2	Life, The Science of Biology (9th Ed.)	Basics and unit 10/11/7/9
3	Lehninger- Principles of Biochemistry	Unit I
4	Stryer Biochemistry / Voet and voet	Unit I
5	Cell and molecular biology – Lodish	Unit 2/4/12/13/
6	i –Genetics -Russel	Unit 3/8/11
7	Watson Molecular Biology of the Gene	Unit 3
8	Kuby Immunology	unit 4
9	Developmental biology – Gilbert/ Wolpert	Unit 5
10	Taiz and Ziger – plant physiology	Unit 6
11	Conceptual genetics – B. Pierce	Unit 3, 8 and 11
12	<ul style="list-style-type: none"> • Principals-and-techniques-of-biochemistry and-molecular-biology-wilson-walker • Biochemistry laboratory [Rodeny Boyer] • FERMENTATION TECHNOLOGY – R.H WHITTEKAR 	Unit 12/13