



MEER SIR ACADEMY

MSc Biotechnology Comparative Entrance Syllabus

Jamia Millia Islamia • Aligarh Muslim University • CUET PG

Admission Session 2027–28

How the three admission routes differ

JMI, AMU and CUET PG do not use one common Biotechnology examination. JMI's 2026–27 admission activity included a university entrance route and a GAT-B score route for its DBT-supported M.Sc. Biotechnology programme. AMU conducts its own admission test. CUET PG has no paper titled simply Biotechnology; universities generally map Biotechnology programmes to Life Sciences SCQP17, Plant Biotechnology SCQP25 or another specified science paper. Candidates must confirm the paper code accepted by the target university before applying.

Institution	Route	Pattern or focus	Main preparation base
JMI	JMI entrance and/or GAT-B route as notified for the programme	JMI schedule listed a 90-minute entrance test; GAT-B has Sections A and B.	Biology, chemistry, mathematics, physics and graduate-level biotechnology.
AMU	University admission test	100 objective questions: Chemistry, Botany, Zoology and Elementary Mathematics.	B.Sc. level biology and chemistry; secondary-level mathematics.
CUET PG	Paper code fixed by participating university	SCQP17 and SCQP25 each have 75 compulsory subject-specific questions.	Life sciences for SCQP17; plant tissue culture and plant-microbe topics for SCQP25.

Common high yield core

- Cell biology, membranes, cell cycle, signalling and transport
- Biochemistry: biomolecules, enzymes, metabolism and bioenergetics
- Molecular biology and genetics: replication, transcription, translation, regulation and inheritance



- Microbiology, virology, immunology and host-pathogen interactions
- Recombinant DNA technology, cloning, PCR, blotting, sequencing and gene transfer
- Plant and animal biotechnology, tissue culture and transgenics
- Analytical techniques, bioinformatics, biostatistics and bioprocess engineering

Jamia Millia Islamia M.Sc. Biotechnology

JMI offers a regular four-semester M.Sc. Biotechnology through the Department of Biotechnology. The programme page identifies a DBT-based course structure, and the 2026–27 notices also recorded admission through GAT-B scores. Candidates should follow the route specified in the current JMI notice for their category and programme version.

GAT-B examination structure

Section	Level and subjects	Questions	Marks and negative marking
A	10+2 Physics, Chemistry, Mathematics and Biology	60 compulsory	60 marks; +1 correct, -0.5 wrong
B	Graduate-level Basic Biology, Life Sciences, Biotechnology and allied areas	100 given; attempt 60	180 marks; +3 correct, -1 wrong
Total	Both sections	Attempt 120 of 160	240 marks

Section B detailed syllabus

Biochemistry and metabolism

- Structure and function of biomolecules
- Biological membranes, action potential and transport
- Enzyme classification, kinetics and mechanisms
- Carbohydrate, lipid, amino-acid and nucleic-acid metabolism
- Photosynthesis, respiration, electron transport and bioenergetics

Microbiology and virology

- Virus structure and classification
- Bacterial, algal and fungal diversity
- Microbial growth, nutrition and laboratory methods
- Aerobic/anaerobic respiration and nitrogen fixation
- Microbial diseases and host-pathogen interaction



Cell biology and genetics

- Prokaryotic and eukaryotic cells
- Cell cycle, growth control, communication and signalling
- Genes, chromosomes, mutations and mutagenesis
- Replication, transcription, translation and regulation
- Mendelian genetics, linkage, complementation and horizontal gene transfer
- RNA interference, DNA repair, chromosomal variation and genetic disease

Analytical techniques

- Light, electron, fluorescence and confocal microscopy
- High-speed and ultracentrifugation
- UV-visible, CD, IR/FTIR, Raman, MS and NMR spectroscopy
- Ion exchange, gel filtration, hydrophobic, affinity, GC, HPLC and FPLC chromatography
- Electrophoresis and microarrays

Immunology

- Innate, humoral and cell-mediated immunity
- Antigens, antibodies and antibody diversity
- Complement, lymphoid organs, B cells, T cells and macrophages
- MHC, antigen processing and presentation
- Monoclonal antibodies, tolerance, hypersensitivity, autoimmunity and transplantation

Bioinformatics

- Databases and search tools
- Sequence formats, scoring matrices, alignment and phylogeny
- Genomic/proteomic data mining
- Basic molecular dynamics and macromolecular interactions

Genetic engineering

- Restriction/modification enzymes and cloning vectors
- Genomic and cDNA libraries; cloning and expression
- DNA labelling, sequencing, PCR and fingerprinting
- Southern/Northern blotting, in situ hybridization, RAPD and RFLP
- Mutagenesis, gene transfer, gene targeting and gene therapy

Plant and animal biotechnology

- Plant regeneration, totipotency, tissue and suspension culture
- Secondary metabolites, hairy roots and transgenic plants
- Animal cell culture, preservation, carriers and growth kinetics



- Hybridoma, stem cells, cloning and transgenic animals

Bioprocess engineering

- Bioreactor design, mass/heat transfer, rheology, aeration and agitation
- Media optimization, growth and product kinetics
- Batch, fed-batch and continuous processes
- Upstream/downstream processing, scale-up and economics
- Biofuels, bioplastics, enzymes, antibiotics, recombinant proteins and bioremediation

Aligarh Muslim University M.Sc. Biotechnology

AMU's Interdisciplinary Biotechnology Unit prescribes Biology and Chemistry at B.Sc. Honours level and Elementary Mathematics at secondary level. The 2026–27 admission guide specifies one objective paper of 100 questions on Chemistry, Botany, Zoology and Elementary Mathematics.

Biology Botany and Zoology

- Origin and classification of life; prokaryotes, eukaryotes and archaea
- Bacterial/archaeal structure; microbial growth, nutrition and control
- Viruses, virus-like agents and viral diseases
- Plant and animal cell organelles; cell cycle, division and cytoskeleton
- Genetic code, protein synthesis, nucleic acids, chromosomes, replication and repair
- Gene manipulation, vectors, libraries, cloning, PCR, RFLP and blotting
- Animal tissues; nutrition and digestive, circulatory, excretory and reproductive systems; hormones
- Immunology: immune cells, lymphoid tissues, complement, antibodies, hybridoma, MHC, cytokines, vaccines, hypersensitivity, autoimmunity and transplantation
- Plant water transport, transpiration, stomata, mineral nutrition and translocation
- Photosynthesis, nitrogen fixation, ammonia assimilation, movements, photoperiodism and phytohormones
- Algae, fungi, bryophytes, pteridophytes, gymnosperms and angiosperms
- Plant reproduction, pollination, fertilization, dormancy, dispersal and germination
- Ecology: ecosystems, trophic organization, food chains/webs, pyramids and niches
- Clinical aspects of carbohydrate, protein and lipid metabolism; inborn errors

Chemistry

- Atomic structure, periodicity, transition/non-transition elements
- Coordination chemistry, crystal field and ligand field theories
- Chemical equilibrium, thermodynamics, dilute solutions and kinetics
- UV-visible and IR spectroscopy
- Organic chemistry of hydrocarbons, alcohols, phenols, ethers, carbonyls, acids, halides, amines, heterocycles, organometallic and organosulfur compounds



- Ion exchange, size-exclusion and affinity chromatography
- Structure and elementary metabolism of carbohydrates, amino acids, proteins, lipids and nucleic acids

Elementary Mathematics

- Real numbers and decimals
- Polynomials, linear equations, quadratic equations and arithmetic progressions
- Euclidean geometry, lines, angles, triangles, quadrilaterals, circles and constructions
- Trigonometry, identities, heights and distances
- Mensuration: circle areas, surface areas and volumes
- Statistics and probability: graphs, histograms, frequency polygons, mean, median, mode and empirical probability

CUET PG Biotechnology related papers

NTA's 2026 science-paper list does not contain a general Biotechnology paper. The two most relevant official syllabi are Life Sciences SCQP17 and Plant Biotechnology SCQP25. The correct paper depends entirely on the university's programme mapping.

Life Sciences SCQP17

Pattern: 75 compulsory subject-specific questions; bilingual English and Hindi.

Unit	Official coverage
Techniques	Chromatography, spectroscopy, microscopy, electrophoresis, centrifugation, blotting, PCR and radioisotopes.
Chromatin	Chromosome organization, chromatin types, centromeres, telomeres and gene concept.
Biochemistry	Biomolecules, vitamins, bioenergetics, glycolysis, TCA cycle, electron transport, ATP synthesis, fatty-acid metabolism and membranes.
Biotechnology	Recombinant DNA, cloning, applications, plant/animal cell culture and environmental biotechnology.
Microbiology	Microbial diversity, reproduction, antimicrobials, industrial/agricultural roles, immunity, vaccines, viruses and environmental microbiology.
Molecular genetics	Inheritance, linkage, crossing over, aberrations, replication, transcription, translation, repair and population genetics.



Unit	Official coverage
Plant sciences	Major plant groups, vascular system, economic botany, photosynthesis, photoperiodism, vernalization and cycles.
Animal sciences	Animal diversity, human physiology, nerve impulses, endocrinology, diseases, apoptosis, cancer and cell culture.

Plant Biotechnology SCQP25

Pattern: 75 compulsory subject-specific questions; bilingual English and Hindi.

Unit	Official coverage
I	Culture types: seed, embryo, callus, organs, cells and protoplasts; micropropagation, meristem/shoot-tip culture, organogenesis and embryogenesis.
II	Anther and microspore culture, androgenesis, haploids, chromosome doubling, gynogenesis and chromosome elimination.
III	Protoplast isolation and fusion, somatic hybridization, cybrids and somaclonal variation.
IV	Plant growth-promoting bacteria, nitrogen fixation, nitrogenase, hydrogenase, nodulation, biocontrol and growth promotion.

Recommended preparation plan

- Confirm the exact admission route and paper code before preparing a timetable.
- Complete cell biology, biochemistry, molecular biology and genetics first because they overlap across routes.
- Add microbiology, immunology, recombinant DNA methods and analytical techniques.
- For JMI GAT-B, practise Section A science and mathematics alongside graduate-level Section B.
- For AMU, maintain separate Botany, Zoology, Chemistry and Elementary Mathematics revision lists.
- For CUET, follow only the official headings of the accepted SCQP paper and practise 75-question timed tests.

Four week revision framework

Week	Core study	Route-specific work
1	Cell biology, biomolecules, enzymes and metabolism	JMI: Section A basics; AMU: Chemistry; CUET: SCQP checklist
2	Molecular biology, genetics and recombinant	JMI: genetic engineering; AMU:



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*We Deliver Results,
Not Promises.*

Week	Core study	Route-specific work
	DNA	Botany/Zoology; CUET: techniques
3	Microbiology, immunology, plant and animal biotechnology	JMI: bioprocess; AMU: mathematics; SCQP25: tissue culture
4	Instrumentation, bioinformatics, mixed revision	Full mocks, error log, formulas and factual revision

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