VPM CLASSES

JNU (GAT-B)

EXAM INFORMATION

GRADUATE APTITUDE TEST - BIOTECHNOLOGY

(GAT- B)

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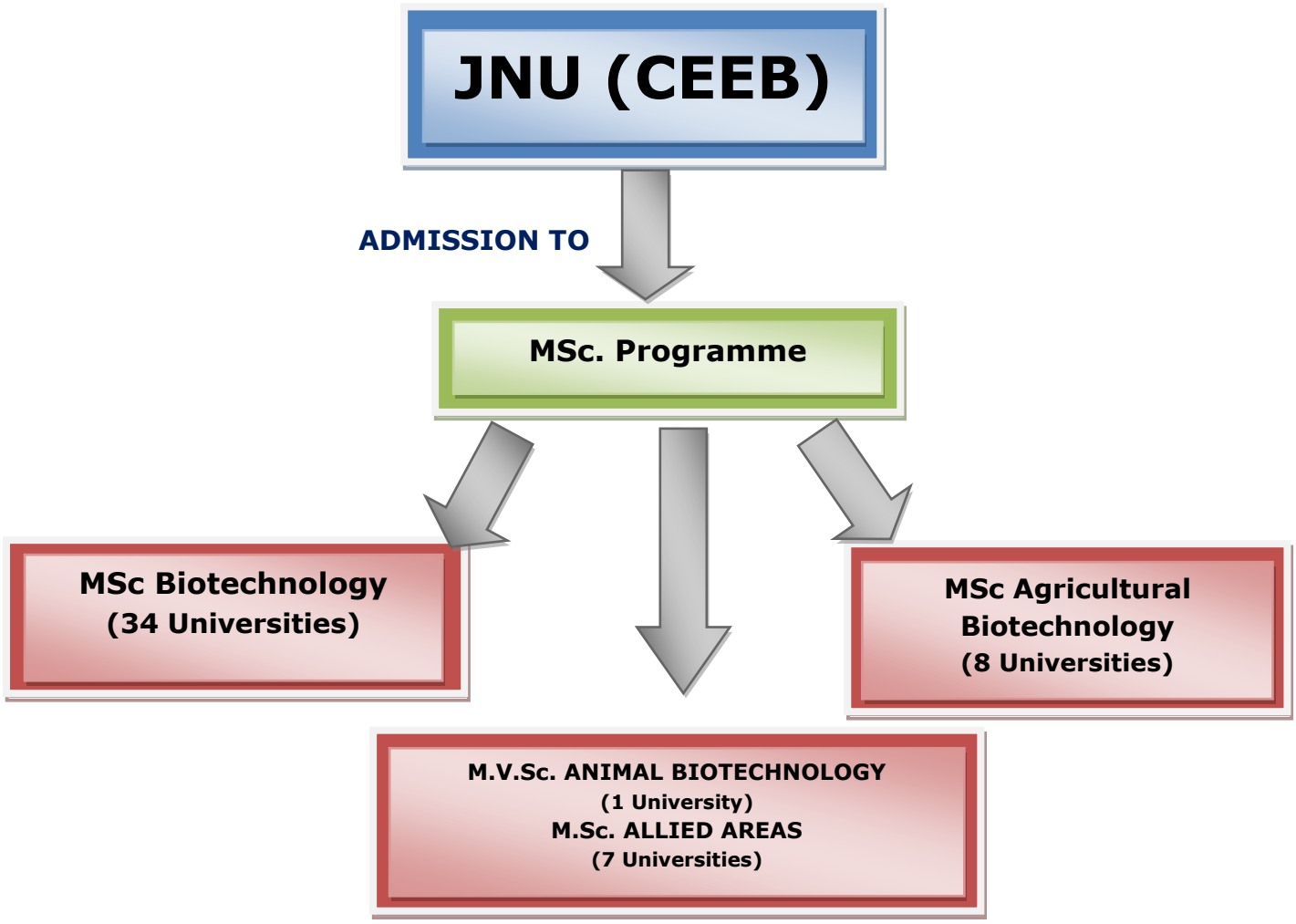
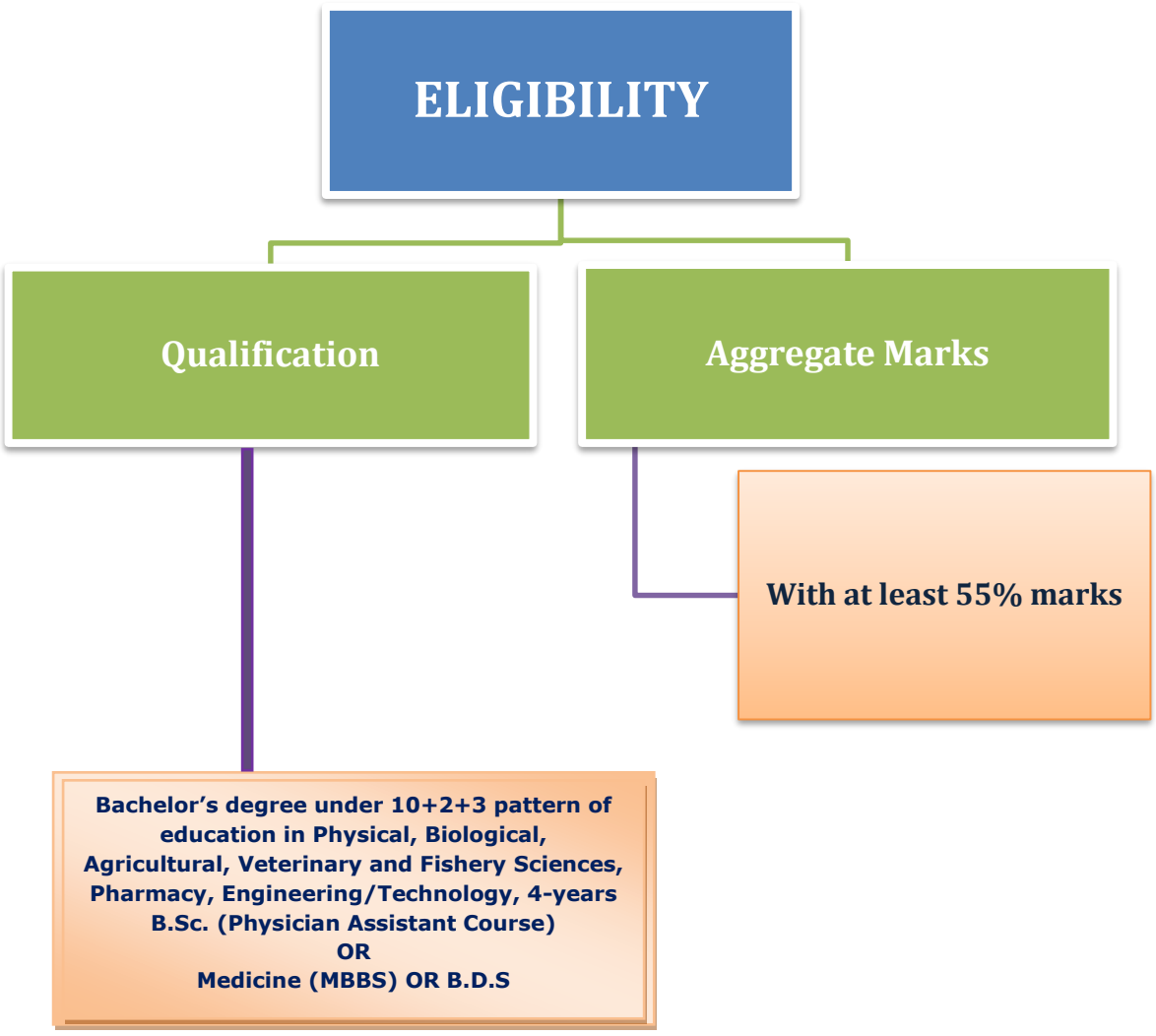
JNU (GAT-B)

- The Graduate Aptitude Test in Biotechnology (GAT-B), being conducted by the *Regional Centre for Biotechnology* on behalf of the Department of Biotechnology, Government of India.
- The GAT-B is the admission eligibility test for DBT-supported PG programmes in the various institutions.
- The role of conducting the JNU CEEB has been taken up by the National Testing Agency (NTA).



ELIGIBILITY CRITERIA: -



You may further verify the eligibility criteria for a programme on the respective institution website.

Refer - *DBT-supported programmes in participating institutions*

EXAM PATTERN: -

PATTERN	PART A	PART B
Multiple choice questions	At the level of 10+2 in the subjects - (*Physics, Chemistry, Mathematics, and Biology*)	Bachelor's level requiring thinking and analysis. Based on *Physics, Mathematics, Biology* (e.g., Botany, Zoology, Biochemistry, Microbiology, Genetics and Molecular Biology) and Chemistry.
No. of questions to be attempted	60 (Compulsory)	60 (to be attempted out of 100)
Total Marks	60	180
Marks for correct Answer	1 Marks for each correct response	3 Marks for each correct response
Marks for Incorrect Answer	**½ (half)** mark will be deducted for each wrong answer	**1** mark will be deducted for each wrong answer
Duration of the examination	3 hours (180 Minutes)	
Mode of Exam	CBT (Computer Based Test)	
Medium	English	

PART-B SYLLABUS

Biomolecules-structure and functions; Biological membranes, structure, action potential and transport processes; Enzymes- classification, kinetics and mechanism of action; Basic concepts and designs of metabolism (carbohydrates, lipids, amino acids and nucleic acids) photosynthesis, respiration and electron transport chain; Bioenergetics.

Viruses- structure and classification; Microbial classification and diversity (bacterial, algal and fungal); Methods in microbiology; Microbial growth and nutrition; Aerobic and anaerobic respiration; Nitrogen fixation; Microbial diseases and host-pathogen interaction.

Prokaryotic and eukaryotic cell structure; Cell cycle and cell growth control; Cell-Cell communication, Cell signalling and signal transduction.

Molecular structure of genes and chromosomes; Mutations and mutagenesis; Nucleic acid replication, transcription, translation and their regulatory mechanisms in prokaryotes and eukaryotes; Mendelian inheritance; Gene interaction; Complementation; Linkage, recombination and chromosome mapping; Extra chromosomal inheritance; Microbial genetics (plasmids, transformation, transduction, conjugation); Horizontal gene transfer and Transposable elements; RNA interference; DNA damage and repair; Chromosomal variation; Molecular basis of genetic diseases.

Principles of microscopy-light, electron, fluorescent and confocal; Centrifugation-high speed and ultra; Principles of spectroscopy-UV, visible, CD, IR, FTIR, Raman, MS, NMR; Principles of chromatography- ion exchange, gel filtration, hydrophobic interaction, affinity, GC, HPLC, FPLC; Electrophoresis; Microarray.

History of Immunology; Innate, humoral and cell mediated immunity; Antigen; Antibody structure and function; Molecular basis of antibody diversity; Synthesis of antibody and secretion; Antigen-antibody reaction; Complement; Primary and secondary lymphoid organ; B and T cells and macrophages; Major histocompatibility complex (MHC); Antigen processing and presentation; Polyclonal and monoclonal antibody; Regulation of immune response; Immune tolerance; Hypersensitivity; Autoimmunity; Graft versus host reaction.

Major bioinformatics resources and search tools; Sequence and structure databases; Sequence analysis (bimolecular sequence file formats, scoring matrices, sequence alignment, phylogeny); Data mining and analytical tools for genomic and proteomic studies; Molecular dynamics and simulations (basic concepts including force fields, protein-protein, protein-nucleic acid, protein-ligand interaction)

Restriction and modification enzymes; Vectors; plasmid, bacteriophage and other viral vectors, cosmids, Ti plasmid, yeast artificial chromosome;

mammalian and plant expression vectors; cDNA and genomic DNA library; Gene isolation, cloning and expression ; Transposons and gene targeting; DNA labeling; DNA sequencing; Polymerase chain reactions; DNA fingerprinting; Southern and northern blotting; In- situ hybridization; RAPD, RFLP; Site-directed mutagenesis; Gene transfer technologies; Gene therapy.

Totipotency; Regeneration of plants; Plant growth regulators and elicitors; Tissue culture and Cell suspension culture system: methodology, kinetics of growth and, nutrient optimization; Production of secondary metabolites by plant suspension cultures; Hairy root culture; transgenic plants; Plant products of industrial importance.

Animal cell culture; media composition and growth conditions; Animal cell and tissue preservation; Anchorage and non-anchorage dependent cell culture; Kinetics of cell growth; Micro & macro-carrier culture; Hybridoma technology; Stem cell technology; Animal cloning; Transgenic animals.

Chemical engineering principles applied to biological system, Principle of reactor design, ideal and non- ideal multiphase bioreactors, mass and heat transfer; Rheology of fermentation fluids, Aeration and agitation; Media formulation and optimization; Kinetics of microbial growth, substrate utilization and product formation; Sterilization of air and media; Batch, fed-batch and continuous processes; Various types of microbial and enzyme reactors; Instrumentation control and optimization; Unit operations in solid-liquid separation and liquid-liquid extraction; Process scale-up, economics and feasibility analysis.

Engineering principle of bioprocessing - Upstream production and downstream; Bioprocess design and development from lab to industrial scale; Microbial, animal and plant cell culture platforms; Production of biomass and primary/secondary metabolites; Biofuels, Bioplastics, industrial enzymes, antibiotics; Large scale production and purification of recombinant proteins; Industrial application of chromatographic and membrane based bio-separation methods; Immobilization of biocatalysts (enzymes and cells) for bioconversion processes; Bioremediation-Aerobic and anaerobic processes for stabilization of solid / liquid wastes.

Tissue culture and its application, Micro propagation. Meristem culture and production of virus-free plants. Anther and microspore culture. Embryo and ovary culture. Protoplast isolation. Protoplast fusion-somatic hybrids, cybrids. Soma clones. Synthetic seeds. In vitro germplasm conservation. Cryopreservation. Organelle DNA, Satellite-and repetitive DNAs. DNA repair. Regulation of gene expression. Recombinant DNA technology-cloning vectors, restriction enzymes, gene cloning. Methods of gene transfer in plants. Achievements and recent developments of genetic engineering in agriculture. Development of transgenics for biotic & abiotic stress tolerance, bioethics, terminator technology, nanotechnology, DNA fingerprinting, gene silencing.