

Entrance test for Admission to M.Sc Programme in Bioresources & Biotechnology (2010)

The test is a little different from those normally conducted in schools or colleges. The candidates will be given a test booklet containing 100 items. Each item will have four options of which only one shall be correct. Correct responses will have to be marked on a separate sheet that will be provided along with the main booklet.

Important Rules for candidates:

1. Do not give more than one answer to any question, as there is only one correct answer to each question. If more than one answer is given for any question, it will be counted as wrong.
2. Follow the instructions given by the supervisor. When supervisor asks you to start or stop the test or a section of the test, you must follow his instructions immediately. This is very important.
3. You will not be permitted to take rough paper, scale or drawing instruments or calculator into the examination hall. Do your rough work in the space provided on the booklet itself.
4. After finishing the test submit the test booklet and the answer sheet to the supervisor. Do not take these out of the hall.
5. Do not forget to write your roll number and question booklet number on the answer sheet in the space provided for the same.
6. Eligible candidates shall be issued Admit Cards by post or by hand on request.
7. Eligible candidates will be allowed to appear in the Entrance test on the production of admit card. Those who do not receive their Admit Card prior to the commencement of the test are advised to contact the Office of the University and collect their duplicate Admit Card personally.
8. The candidates should remain in touch with the University regarding the declaration of the result, merit list, selection list and other related information and also visit our website www.bgsbuniversity.org

SYLLABUS

- Classification of plants and animals; binomial nomenclature, taxonomic ranks, type concept.
- General account of viruses, bacteria, mycoplasma and cyanobacteria, Economic importance of bacteria, bacteria as indicators of pollution, bacteria in industry and agriculture. Lifecycle of a bacteriophage – temperate and lysogenic cycles.
- Structure, formation and function of cell wall and plasma membrane: The bilayer lipid structure, fluid mosaic model, its functions. Cell organelles: structure and function of E.R., golgi bodies, plastids, mitochondria and lysosomes. Ultra structure of nuclear membrane, Nucleolus organization and function. Chromosomes structure, importance of centromere and telomere; Primary and secondary constrictions, polytene, lampbrush and supernumerary chromosomes.

- Organization of DNA in prokaryotic and eukaryotic genomes, Role of histones; Nucleosome model. DNA structure, types (A, B, C, Z), replication and function; Satellite and repetitive DNA, Gene functioning: Genetic code, transcription, Regulation of gene expression in prokaryotes and eukaryotes, inducible and repressible systems.
- Mendelian laws of inheritance; Sex chromosome, Sex determination, Barr body, Lyon's hypothesis, Sex linked inheritance (eye colour in *Drosophilla* and haemophilia in man); Cytoplasmic inheritance - maternal effect on shell coiling in snails (*Lymnaea*), Kappa particles in *Paramecium*.
- ATP – the biological energy currency, aerobic and anaerobic respiration, Krebs's cycle, Electron Transport Mechanism (Chemo – osmotic theory), biofertilizers, nitrogen fixation.
- Darwin's theory of natural selection, Neo – Darwinism- Modern concept of organic evolution and speciation: Gene mutations and recombination as sources of variations, Molecular mechanism of mutations. Isolating mechanisms and their role in speciation.
- Characteristic features and economically important taxa of Papilionaceae, Solanaceae, Asteraceae, Apiaceae, Poaceae and Liliaceae.
- Alternation of generation. Reproductive biology, development of micro- and megaspores in angiosperms, double fertilization, parthenocarpy, apomixes and parthenogenesis.
- Stem and root anatomy, position and activity of various meristems, stomatal types, stellar evolution, secondary growth, lenticels and bark.
- General classification, characteristic features of Non – chordates and chordates. Structure, Reproduction and life history of the following types: *Amoeba*, *Monocystis*, *Plasmodium*, *Paramecium*, *Sycon*, *Hydra*, *Obelia*, *Fasciola*, *Taenia*, *Ascaris*, *Neries*, *Pheretima*, Leech, Prawn, Scorpion, Cockroach, a bivalve, Snail, *Balanoglossus*, an ascidian, *Amphioxus*.
- Comparative anatomy of Vertebrates: Integument, Endoskeleton, Locomotory organs, Digestive system, Respiratory system, heart and Circulatory system, Urinogenital system and sense organs. Elementary physiology of digestion, excretion, respiration, blood, mechanism of circulation with special reference to man, Nerve impulse, Conduction and transmission across synaptic junction.
- Embryology: Gametogenesis, Fertilization, cleavage, gastrulation, early development and metamorphogenesis of Frog, Ascidian and retrogressive metamorphosis. Neotony, Development of foetal membrane in chick and mammals.
- Man's dependence on agriculture: Origin of agriculture, Vavilovian centres of origin; origin, cultivation and pathogens of rice, wheat and maize, Rabi and Kharif crops of India. Plant and animal breeding – conventional & non conventional methods. Sustainable agriculture: Integrated nutrient management, integrated pest management. Organic farming, soil conservation, irrigation and rain water management.
- Agronomy – definition, history, crop rotation, multiple cropping, relay cropping, multistoried cropping, inter – cropping; soil fertility and soil productivity, green manuring; Organic manures and their role in soil fertility; characteristics and usages of nitrogenous, phosphatic and potassic fertilizers. Vermiculture, composting, herbicides and biopesticide production.
- Genetic engineering; definition, tools, enzymes: types and properties; Polymerases, ligases, kinases, phosphatases, endo and exonucleases, DNase, RNase and Proteinases; Cloning vectors; plasmids, cosmids and phages; Genomic and cDNA library

construction. Immuno-diffusion and Immuno-electrophoresis, Immuno-blot, ELISA, RIA, Monoclonal antibodies, Blood products, vaccines and hormones, Transgenic technology, transgenics as factories for production of useful marketable products.

- Gene transfer, vector mediated and vectorless gene transfer; major genes transferred through genetic engineering; application of Genetic engineering, production of transgenic plants and animals (Golden Rice, Bt Cotton, Bt maize, GM soya beans, GM tomato, fish, pig, goat, cow, sheep).
- Distribution and botanical features of important drugs and aromatic plants of J&K (*Artemesia, Atropa, Crocus, Podophyllum, Aconitum, Picrorhiza, Arnebia, Ferula*).
- Phytochemistry in pharmacology. Isolation and characterization of active pharmacological principles: their sources and chemistry, Standardization of drugs.
- Silviculture: concepts and practices of silviculture techniques with special reference to nursery and tree planting; National forest Policy; forest types in India; afforestation, reforestation and deforestation; ecological impact of deforestation on resource availability; definition and scope of agroforestry; farm forestry and social forestry; agroforestry systems classification; criteria of an agroforestry tree.
- Wastelands – types and their management through different agroforestry practices; diagnosis – designing for implementation of agroforestry programmes in mountainous regions; important fodder, fuel, fruit trees of India.

SAMPLE ITEMS

1. The B.O.D of a static water body is high when its water is:
 - a) Clear.
 - b) Polluted.
 - c) Covered with a thick canopy.
 - d) Full of aquatic life.

2. Multiple alleles are present on:
 - a) Many chromosomes of a single genome.
 - b) Different loci of the same chromosome.
 - c) Same locus on the same chromosome.
 - d) Non sister homologous chromatids.

3. "Eltonian pyramids" is the other name for pyramid of:
 - a) Biomass.
 - b) Energy.
 - c) Numbers.
 - d) Frequency.

4. Acid rain is caused because of the presence in air of:
 - a) Carbon monoxide.
 - b) Carbon dioxide.
 - c) Sulphur dioxide.
 - d) Methane.