DUAT-2024

Mode of Conduct of DUAT

The examination will be administered online and proctored by AI technology and human invigilators. You must login using a laptop or desktop computer equipped with a webcam and connected to the internet. The test consists of 60 questions to be completed within a total duration of 60 minutes.

Syllabus

Test Code: DUAT01

Programme: MSc Informatics, Master of Business Administration

Question type	**Syllabus**
General Aptitude 20 Marks	**Verbal Aptitude-**Basic English grammar: Tenses, articles, adjectives, prepositions, conjunctions, verb-noun agreement, and other parts of speech. Basic vocabulary: Words, idioms, and phrases in context. Narrative sequencing. **Quantitative Aptitude-**Data interpretation: Data graphs (bar graphs, pie charts, and other graphs representing data), 2- and 3-dimensional plots, maps, and tables. Numerical computation and estimation: Ratios, percentages, powers, exponents and logarithms, permutations and combinations, summations and series, Mensuration and Geometry **Analytical Aptitude-** Logic: Deduction and induction, analogy, numerical relations, and reasoning **Spatial Aptitude-**Transformation of shapes: Translation, rotation, scaling, mirroring, assembling, grouping, paper folding, cutting, and patterns in 2 and 3 dimensions.
Mathematics 20 Marks	Probability, Statistics, Calculus, Discrete Mathematics, basic number theory, algebra
English Reading comprehension 20 Marks	Two paragraphs, each having 5-10 questions.

Test Code: DUAT02

Programme: MSc Computer Science with specialization Data Analytics/Cybersecurity/Machine Learning; MSc Data Analytics and Computational Science

Question type	Syllabus
General Aptitude 20 Marks	**Verbal Aptitude-**Basic English grammar: Tenses, articles, adjectives, prepositions, conjunctions, verb-noun agreement, and other parts of speech. Basic vocabulary: Words, idioms, and phrases in context. Narrative sequencing. **Quantitative Aptitude-**Data interpretation: Data graphs (bar graphs, pie charts, and other graphs representing data), 2- and 3-dimensional plots, maps, and tables. Numerical computation and estimation: Ratios, percentages, powers, exponents and logarithms, permutations and combinations, summations and series, Mensuration and Geometry **Analytical Aptitude-** Logic: Deduction and induction, analogy, numerical relations, and reasoning **Spatial Aptitude-**Transformation of shapes: Translation, rotation, scaling, mirroring, assembling, grouping, paper folding, cutting, and patterns in 2 and 3 dimensions.
Basic Mathematics 30 Marks	**Set Theory-**Concept of sets – Union, Intersection, Cardinality, Elementary counting; permutations and combinations. **Probability and Statistics-**Basic concepts of probability theory, Averages, Dependent and independent events, frequency distributions, measures of central tendencies and dispersions. **Algebra-**Fundamental operations in algebra, expansions, factorization, simultaneous linear /quadratic equations, indices, logarithms, arithmetic, geometric and harmonic progressions, determinants and matrices. **Coordinate Geometry-**Rectangular Cartesian coordinates, distance formulae, equation of a line, and intersection of lines, pair of straight lines, equations of a circle, parabola, ellipse and hyperbola. **Calculus-**Limit of functions, continuous function, differentiation of function, tangents and normal, simple examples of maxima and minima. Integration of functions by parts, by substitution and by partial fraction, definite integrals, applications of definite integrals to areas.

	Vectors-Position vector, addition and subtraction of vectors, scalar and vector products and their applications to simple geometrical problems and mechanics. **Trigonometry-**Simple identities, trigonometric equations, properties of triangles, solution of triangles, heights and distances, general solutions of trigonometric equations.
BSc level questions 10 Marks	**Computer Basics**: Organization of a computer, Central Processing Unit (CPU), structure of instructions in CPU, input/output devices, computer memory, and back-up devices. **Data Representation**: Representation of characters, integers and fractions, binary and hexadecimal representations, binary arithmetic: addition, subtraction, multiplication, division, simple arithmetic and two's complement arithmetic, floating-point representation of numbers, Boolean algebra, truth tables, Venn diagrams.

Test Code: DUAT03

Programme: MSc Electronics, MSc Applied Physics

Marks	Syllabus
General Aptitude 20 Marks	**Verbal Aptitude-**Basic English grammar: Tenses, articles, adjectives, prepositions, conjunctions, verb-noun agreement, and other parts of speech. Basic vocabulary: Words, idioms, and phrases in context. Narrative sequencing. **Quantitative Aptitude-**Data interpretation: Data graphs (bar graphs, pie charts, and other graphs representing data), 2- and 3-dimensional plots, maps, and tables. Numerical computation and estimation: Ratios, percentages, powers, exponents and logarithms, permutations and combinations, summations and series, Mensuration and Geometry **Analytical Aptitude-** Logic: Deduction and induction, analogy, numerical relations, and reasoning **Spatial Aptitude-**Transformation of shapes: Translation, rotation, scaling, mirroring, assembling, grouping, paper folding, cutting, and patterns in 2 and 3 dimensions.

Mathematics 10 Marks	**Linear Algebra**: Matrix Algebra, Systems of linear equations, Eigenvalues, Eigenvectors. **Calculus**: Mean value theorems, Theorems of integral calculus, Evaluation of definite and improper integrals, Partial Derivatives, Maxima and minima, Fourier series **Differential equations**: First order equations (linear and nonlinear), Higher order linear differential equations with constant coefficients, Method of variation of parameters, Partial Differential Equations. **Probability and Statistics**: Sampling theorems, Conditional probability, Mean, Median, Mode, Standard Deviation, Random variables, Discrete and Continuous distributions, Poisson distribution, Normal distribution, Binomial distribution, Correlation analysis, Regression analysis
Solid State Physics, Devices, Electronics Circuits 30 Marks	Crystal structure, Bravais lattices and basis. Miller indices. X-ray diffraction and Bragg's law Intrinsic and extrinsic semiconductors, variation of resistivity with temperature. Fermi level. p-n junction diode, I-V characteristics, diffusion current, drift current, mobility and resistivity, Zener diode and its applications BJT: characteristics in CB, CE, CC modes. Single stage amplifier, two stage R-C coupled amplifiers. MOS capacitor, MOSFET, LED, photo diode and solar cell Boolean algebra: Binary number systems; conversion from one system to another system; binary addition and subtraction. Logic Gates*:* AND, OR, NOT, NAND, NOR exclusive OR; Truth tables; combination of gates; de Morgan’s theorem Simple DC and AC circuits with R, L and C components. Kirchhoff's Voltage/current Law, superposition, Thevenin's theorem, Norton’s theorem, reciprocity, maximum power transfer. *Oscillators*: Barkhausen condition, sinusoidal oscillators. OP-AMP Inverting and noninverting amplifier.

Test Code: DUAT04

Programme: MSc Ecology with Specialization in Ecological Informatics

Question type	Syllabus
General Aptitude 20 Marks	**Verbal Aptitude-**Basic English grammar: Tenses, articles, adjectives, prepositions, conjunctions, verb-noun agreement, and other parts of speech. Basic vocabulary: Words, idioms, and phrases in context. Narrative sequencing. **Quantitative Aptitude-**Data interpretation: Data graphs (bar graphs, pie charts, and other graphs representing data), 2- and 3-dimensional plots, maps, and tables. Numerical computation and estimation: Ratios, percentages, powers, exponents and logarithms, permutations and combinations, summations and series, Mensuration and Geometry **Analytical Aptitude-** Logic: Deduction and induction, analogy, numerical relations, and reasoning **Spatial Aptitude-**Transformation of shapes: Translation, rotation, scaling, mirroring, assembling, grouping, paper folding, cutting, and patterns in 2 and 3 dimensions.
Elementary mathematics and computer basics 10 Marks	Number System, Sets, Functions, Algebra, Geometry, Trigonometry, Matrices and Determinants, Differentiation and Integration, Basic Statistics and Probability. Fundamentals of computers, operating systems, algorithm, data types, operators, basics of internet, programming languages, software applications.
Subject Questions (BSc Level) 30 Marks	**Physical and Chemical Science-** Fundamentals of thermodynamics, fundamentals of ecological physics, solar radiation and Earth's energy budget, radiation laws, atmospheric and terrestrial interaction of electromagnetic radiation, hydrological and biogeochemical cycles, fluid dynamics, fundamentals of electronics, and computational physics. Scope of environmental chemistry, Environmental pollution- Air, water, soil, pollutants in the environment and its interactions, consequences of pollution, assessment and control measures **Life Science-** Eukaryotic and prokaryotic cells- structure and function, taxonomy and systematics, anatomy physiology, reproduction, developmental biology, molecular biology, ethology. Origin of life, geological time scale, theories of evolution, speciation, inheritance of variation, mutation, and genetic variation, phenotypic variation, natural selection and adaptation, response of organisms to abiotic factors- thermoregulation, biogeography- global pattern of biodiversity, biodiversity of Indian sub-continent, major

	biomes of the world **Ecology and environmental science-** Basic concepts in Ecology and Environmental Science, Components of the atmosphere- lithosphere, hydrosphere, and biosphere, biotic factors- producers, consumers, decomposers, abiotic factors-temperature, soil, water, air, Food chain and energy flow, trophic structure, ecological niche, ecological interactions-competition, predation, symbiotic interactions, parasitism terrestrial ecosystem- forest, grassland, desert, aquatic ecosystems- freshwater ecosystem. estuary and marine ecosystem, Natural Resource management and conservation-Forest, Land, Food, Mineral, and energy resources, depletion of natural resources, habitat loss, species extinction, land degradation, climate change, Sustainable development, conservation biology

Test Code: DUAT05

Programme: MSc Data Analytics and BioAI

Question type	Syllabus
General Aptitude 20 Marks	**Verbal Aptitude-**Basic English grammar: Tenses, articles, adjectives, prepositions, conjunctions, verb-noun agreement, and other parts of speech. Basic vocabulary: Words, idioms, and phrases in context. Narrative sequencing. **Quantitative Aptitude-**Data interpretation: Data graphs (bar graphs, pie charts, and other graphs representing data), 2- and 3-dimensional plots, maps, and tables. Numerical computation and estimation: Ratios, percentages, powers, exponents and logarithms, permutations and combinations, summations and series, Mensuration and Geometry **Analytical Aptitude-** Logic: Deduction and induction, analogy, numerical relations, and reasoning **Spatial Aptitude-**Transformation of shapes: Translation, rotation, scaling, mirroring, assembling, grouping, paper folding, cutting, and patterns in 2 and 3 dimensions.
Basic Mathematics 10 Marks	**Set Theory**: Concept of sets – Union, Intersection, Cardinality, Elementary counting; permutations and combinations. **Probability and Statistics**: Basic concepts of probability theory, Averages, Dependent and independent events, frequency distributions, measures of central tendencies and dispersions.

BSc level questions 20 Marks	**Biochemistry:** Structure and functions of proteins, DNA, RNA, carbohydrates, lipids & vitamins. Bioenergetics, Electron Transport System and ATP synthesis, membrane structure and function. **Biotechnology**: Recombinant DNA technology, principles of gene cloning, applications of biotechnology in medicine, industry and agriculture, animal & plant cell culture, environmental biotechnology. **Molecular Genetics**: Principles of inheritance, linkage & crossing over, chromosomal aberrations, extrachromosomal inheritance, replication, transcription, translation, DNA repair and population genetics, mutation. **Chemistry**: Atomic Structure, Periodic Properties, Chemical bonding, Distribution of electrons in organic compounds. Stereo Chemistry, Configurational Isomerism, medicinal chemistry.
BSc level questions 10 Marks	**Computer Basics**: Organization of a computer, Central Processing Unit (CPU), structure of instructions in CPU, input/output devices, computer memory, and back-up devices. **Data Representation**: Representation of characters, integers and fractions, binary and hexadecimal representations, binary arithmetic: addition, subtraction, multiplication, division, simple arithmetic and two's complement arithmetic, floating-point representation of numbers, Boolean algebra, truth tables, Venn diagrams.

Test Code: DUAT06

Programme: MSc Data Analytics and Geoinformatics

Question type	**Syllabus**
General Aptitude 20 Marks	**Verbal Aptitude-**Basic English grammar: Tenses, articles, adjectives, prepositions, conjunctions, verb-noun agreement, and other parts of speech. Basic vocabulary: Words, idioms, and phrases in context. Narrative sequencing. **Quantitative Aptitude-**Data interpretation: Data graphs (bar graphs, pie charts, and other graphs representing data), 2- and 3-dimensional plots, maps, and tables. Numerical computation and estimation: Ratios, percentages, powers, exponents and logarithms, permutations and combinations, summations and series, Mensuration and Geometry

	Analytical Aptitude- Logic: Deduction and induction, analogy, numerical relations, and reasoning **Spatial Aptitude-**Transformation of shapes: Translation, rotation, scaling, mirroring, assembling, grouping, paper folding, cutting, and patterns in 2 and 3 dimensions.
BSc level Mathematics 10 Marks	**Statistics and Probability**: Measure of Central tendency, Measure of dispersion, skewness and Kurtosis, Elementary analysis of data. Probability and properties, conditional probability, multiplication rule. Total probability. Bayes' theorem and independence of events.
BSc level questions 20 Marks	**Earth Sciences**: Structure and composition of Environment- Atmosphere, Hydrosphere and Lithosphere, Earth Processes, Mineral and Power Resources in India, Biogeochemical Cycles, Meteorology, Climate Change, Origin and evolution of earth, Mineral and Power Resources in India. Agriculture Land Use/ Land Utilization Systems. **Ecology and Environment**: Biosphere, Organizational levels of biosphere, Ecosystem: Structure and Types, Food Chain and Energy Flow, Population and Community Ecology, Biodiversity and its Conservation. **Natural resources and Management**: Natural Resources-Forest, Land and Water Resources, Minerals, Marine, Energy (Renewable and Non-renewable) - Sources, Threats, Conservation and Management. **Remote sensing and GIS:** Electro Magnetic Spectrum, Components and types of remote sensing, Resolutions (Spectral, Spatial, Temporal & Radiometric), Platforms. GIS: components of GIS, Spatial data, Vector and Raster Data, GIS Data Model and Data Structure - Projection and coordinate Systems.
BSc level questions 10 Marks	**Computer Basics:** Organization of a computer, Central Processing Unit (CPU), structure of instructions in CPU, input/output devices, computer memory, and back-up devices. **Data Representation:** Representation of characters, integers and fractions, binary and hexadecimal representations, binary arithmetic: addition, subtraction, multiplication, division, simple arithmetic and two's complement arithmetic, floating-point representation of numbers, Boolean algebra, truth tables, Venn diagram