GENERAL APTITUDE(GA)

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

Reading and comprehension

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, and series

Mensuration and geometry

Elementary statistics and probability

Analytical Aptitude

Logic: deduction and induction

Analogy

Numerical relations and reasoning

Spatial Aptitude

Transformation of shapes: translation, rotation, scaling, mirroring, assembling, and grouping

Paper folding, cutting, and patterns in 2 and 3 dimensions

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ECOLOGY AND EVOLUTION(EY)

Section 1: Ecology

Fundamental concepts: Abiotic and biotic components; scales (population, species, community, ecosystems, biomes); niches and habitats Population ecology: Population growth rates (density dependent/independent); metapopulation ecology (colonization, persistence, extinction, patches, sources, sinks); age- structured populations

Interactions: Types (mutualism, symbiosis, commensalism, competition, parasitism, predation, etc); ecophysiology (physiological adaptations to abiotic environment); prey-predator interactions (Lotka-Voltera equation etc)

Community ecology: Community assembly, organization and succession; species richness, evenness and diversity indices, species-area relationships; theory of island biogeography Ecosystems structure and function: trophic levels and their interactions; nutrient cycles; primary and secondary productivity

Section 2: Evolution

History of Evolutionary thought: Lamarckism; Darwinism; Modern Synthesis Fundamentals: Variation; heritability; natural selection; fitness and adaptation; types of selection (stabilizing, directional, disruptive)

Diversity of life: Origin and history of life on earth; diversity and classification of life; systems of classification (cladistics and phenetics) Life history strategies: Allocation of resources; tradeoffs; r/K selection; semelparity and iteroparity

Interactions: Co-evolution (co-adaptations, arms race, Red Queen hypothesis, co- speciation); prey-predator interactions (mimicry, crypsis, etc) Population and Quantitative genetics: Origins of genetic variation; Mendelian genetics; Hardy-Weinberg equilibrium; drift; selection (one-locus two-alleles model); population genetic structure (panmixia, gene flow, FST); polygenic traits; gene-environment interactions (phenotypic plasticity); heritability

Molecular evolution and phylogenetics: Neutral theory; molecular clocks; rates of evolution; phylogenetic reconstruction; molecular systematics Macroevolution: Species concepts and speciation; adaptive radiation; convergence; biogeography

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Section 3: Mathematics and Quantitative Ecology

Mathematics and statistics in ecology: Simple functions (linear, quadratic, exponential, logarithmic, etc); concept of derivatives and slope of a function; permutations and combinations; basic probability (probability of random events; sequences of events, etc); frequency distributions and their descriptive statistics (mean, variance, coefficient of variation, correlation, etc).

Statistical hypothesis testing: Concept of p-value; Type I and Type II error, test statistics like t-test and Chi-square test; basics of linear regression and ANOVA.

Section 4: Behavioural Ecology

Classical Ethology: Instinct; fixed action patters; imprinting; learnt behavior; proximate and ultimate questions

Sensory ecology: Neuroethology; communication (chemical, acoustic and visual signaling); recognition systems

Foraging ecology: Foraging behaviour; optimal foraging theory

Reproduction: Cost of sex; sexual dimorphism; mate choice; sexual selection (runaway selection, good-genes, handicap principle, etc); sexual conflict; mating systems; parental care

Social living: Costs and benefits of group-living (including responses to predators); effect of competition (scramble and contest) on group formation; dominance relationships; eusociality; kin selection; altruism; reciprocity; human behaviour

Section 5: Applied Ecology & Evolution

Biodiversity and conservation: Importance of conserving biodiversity; ecosystem services; threats to biodiversity; invasive species; in-situ conservation (endemism, biodiversity hotspots, protected areas); ex-situ conservation; conservation genetics (genetic diversity, inbreeding depression); DNA fingerprinting and DNA barcoding Disease ecology and evolution: Epidemiology; zoonotic diseases; antibiotic resistance; vector control

Plant and animal breeding: Marker assisted breeding; genetic basis of economically important traits

Global climate change: Causes; consequences; mitigation

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