GRE General Test Syllabus 2011

Analytical Writing:-

The Analytical Writing section consists of two analytical writing tasks: a 45-minute "Present Your Perspective on an Issue" task and a 30-minute "Analyze an Argument" task.

* The "Issue" task states an opinion on an issue of general interest and asks you to address the issue from any perspective(s) you wish, as long as you provide relevant reasons and examples to explain and support your views.
* The "Argument" task presents a different challenge — it requires you to critique an argument by discussing how well-reasoned you find it. You are asked to consider the logical soundness of the argument rather than to agree or disagree with the position it presents.
* The "Issue" and "Argument" tasks are complementary in that the "issue" task requires you to construct a personal argument about an issue, and the "argument" task requires you to critique someone else's argument by assessing its claims.

Verbal Reasoning:-

There are four types of questions in the Verbal Reasoning section of the GRE General Test:-

* Analogies — Analogy questions test your ability to recognize the relationship between the words in a word pair and to recognize when two word pairs display parallel relationships. To answer an analogy question, you must formulate the relationship between the words in the given word pair and then select the answer containing those words most closely related to one another. Some examples are relationships of kind, size, spatial contiguity or degree.
* Antonyms — Antonym questions measure the strength of your vocabulary and ability to reason from a given concept to its opposite. Antonyms may require only general knowledge of a word, or they may require that you make fine distinctions among answer choices. Answer choices may be single words or phrases.
* Sentence Completions — Sentence completion questions measure your ability to use a variety of cues provided by syntax and grammar to recognize the overall meaning of a sentence and analyze the relationships among the component parts of the sentence. You select which of five words or sets of words can best complete a sentence to give it a logically satisfying meaning and allow it to be read as a stylistically integrated whole.
* Reading Comprehension — Reading comprehension questions measure your ability to read with understanding, insight and discrimination. These questions explore your ability to analyze a written passage from several perspectives, including your ability to recognize explicitly stated elements as well as underlying statements or arguments and their implications.

There are three types of questions in the Quantitative Reasoning section of the GRE General Test:

* Quantitative Comparison — These questions test your ability to reason quickly and accurately about the relative sizes of two quantities or to perceive that not enough information is provided to make such a comparison.
* Problem Solving — The format of these multiple-choice questions varies. The solution may require simple computations, manipulations or multistep problem-solving.
* Data Interpretation — Some problem-solving questions involve data analysis. Many occur in sets of two to five questions that share common data in the form of tables or graphs that allow you to read or estimate data values.

GRE Subject Test Syllabus 2011:-

Biochemistry, Cell and Molecular Biology:-

I. BIOCHEMISTRY — 36%

1. Chemical and Physical Foundations
   * Thermodynamics and kinetics
   * Redox states
   * Water, pH, acid-base reactions and buffers
   * Solutions and equilibria
   * Solute-solvent interactions
   * Chemical interactions and bonding
   * Chemical reaction mechanisms

2. Structural Biology: Structure, Assembly, Organization and Dynamics
   * Small molecules
   * Macromolecules (e.g., nucleic acids, polysaccharides, proteins and complex lipids)
   * Supramolecular complexes (e.g., membranes, ribosomes and multienzyme complexes)

3. Catalysis and Binding
   * Enzyme reaction mechanisms and kinetics
   * Ligand-protein interaction (e.g., hormone receptors, substrates and effectors, transport proteins and antigen-antibody interactions)

4. Major Metabolic Pathways
   * Carbon, nitrogen and sulfur assimilation
   * Anabolism
   * Catabolism
   * Synthesis and degradation of macromolecules

5. Bioenergetics (including respiration and photosynthesis)
   * Energy transformations at the substrate level
   * Electron transport
   * Proton and chemical gradients
   * Energy coupling (e.g., phosphorylation and transport)

6. Regulation and Integration of Metabolism
   * Covalent modification of enzymes
   * Allosteric regulation
   * Compartmentalization

    * Hormones

7. Methods
    * Biophysical approaches (e.g., spectroscopy, x-ray, crystallography, mass spectroscopy)
    * Isotopes
    * Separation techniques (e.g., centrifugation, chromatography and electrophoresis)
    * Immunotechniques

II. CELL BIOLOGY — 28%

Methods of importance to cellular biology, such as fluorescence probes (e.g., FRAP, FRET and GFP) and imaging, will be covered as appropriate within the context of the content below.

1. Cellular Compartments of Prokaryotes and Eukaryotes: Organization, Dynamics and Functions
    * Cellular membrane systems (e.g., structure and transport across membrane)
    * Nucleus (e.g., envelope and matrix)
    * Mitochondria and chloroplasts (e.g., biogenesis and evolution)
2. Cell Surface and Communication
    * Extracellular matrix (including cell walls)
    * Cell adhesion and junctions
    * Signal transduction
    * Receptor function
    * Excitable membrane systems
3. Cytoskeleton, Motility and Shape
    * Regulation of assembly and disassembly of filament systems
    * Motor function, regulation and diversity
4. Protein, Processing, Targeting and Turnover
    * Translocation across membranes
    * Posttranslational modification
    * Intracellular trafficking
    * Secretion and endocytosis
    * Protein turnover (e.g., proteosomes, lysosomes, damaged protein response)
5. Cell Division, Differentiation and Development
    * Cell cycle, mitosis and cytokinesis
    * Meiosis and gametogenesis
    * Fertilization and early embryonic development (including positional information, homeotic genes, tissue-specific expression, nuclear and cytoplasmic interactions, growth factors and induction, environment, stem cells and polarity)

III. MOLECULAR BIOLOGY AND GENETICS — 36%

1. Genetic Foundations
    * Mendelian and non-Mendelian inheritance
    * Transformation, transduction and conjugation
    * Recombination and complementation
    * Mutational analysis
    * Genetic mapping and linkage analysis
2. Chromatin and Chromosomes
    * Karyotypes
    * Translocations, inversions, deletions and duplications
    * Aneuploidy and polyploidy
    * Structure
    * Epigenetics
3. Genomics
    * Genome structure
    * Repeated DNA and gene families
    * Gene identification
    * Transposable elements
    * Bioinformatics
    * Proteomics
    * Molecular evolution
4. Genome Maintenance
    * DNA replication
    * DNA damage and repair
    * DNA modification
    * DNA recombination and gene conversion
5. Gene Expression
    * The genetic code
    * Transcription/transcriptional profiling
    * RNA processing
    * Translation
6. Gene Regulation
    * Positive and negative control of the operon
    * Promoter recognition by RNA polymerases
    * Attenuation and antitermination
    * Cis-acting regulatory elements
    * Trans-acting regulatory factors
    * Gene rearrangements and amplifications
    * Small non-coding RNA (e.g., siRNA, microRNA)
7. Viruses
    * Genome replication and regulation
    * Virus-host interactions
8. Methods
    * Restriction maps and PCR
    * Nucleic acid blotting and hybridization
    * DNA cloning in prokaryotes and eukaryotes
    * Sequencing and analysis

* Protein-nucleic acid interaction
* Transgenic organisms
* Microarrays

Biology:-

* The test consists of approximately 200 five-choice questions, a number of which are grouped in sets toward the end of the test and are based on descriptions of laboratory and field situations, diagrams or experimental results.
* The content of the test is organized into three major areas: cellular and molecular biology, organismal biology and ecology and evolution. Approximately equal weight is given to each of these three areas. In addition to the total score, a subscore in each of these subfield areas is reported. Subject area subdivisions indicated by Arabic numerals may not contain equal numbers of questions.

The approximate distribution of questions by content category is shown below.

I. CELLULAR AND MOLECULAR BIOLOGY (33–34%)

* Fundamentals of cellular biology, genetics and molecular biology are addressed.
* Major topics in cellular structure and function include metabolic pathways and their regulation, membrane dynamics and cell surfaces, organelles, cytoskeleton, and cell cycle.
* Major areas in genetics and molecular biology include chromatin and chromosomal structure, genomic organization and maintenance, and the regulation of gene expression.
* The cellular basis of immunity and the mechanisms of antigen-antibody interactions are included. Distinctions between prokaryotic and eukaryotic cells are considered where appropriate.
* Attention is also given to experimental methodology.

1. Cellular Structure and Function (16–17%)
    1. Biological compounds
        * Macromolecular structure and bonding
        * Abiotic origin of biological molecules
    2. Enzyme activity, receptor binding and regulation
    3. Major metabolic pathways and regulation
        * Respiration, fermentation and photosynthesis
        * Synthesis and degradation of macromolecules
        * Hormonal control and intracellular messengers
    4. Membrane dynamics and cell surfaces
        * Transport, endocytosis and exocytosis
        * Electrical potentials and transmitter substances
        * Mechanisms of cell recognition, cell junctions and plasmodesmata
        * Cell wall and extracellular matrix
    5. Organelles: structure, function, synthesis and targeting
        * Nucleus, mitochondria and plastids
        * Endoplasmic reticulum and ribosomes
        * Golgi apparatus and secretory vesicles
        * Lysosomes, peroxisomes and vacuoles
    6. Cytoskeleton, motility and shape
        * Actin-based systems
        * Microtubule-based systems
        * Intermediate filaments
        * Bacterial flagella and movement
    7. Cell cycle, growth, division and regulation (including signal transduction)
    8. Methods
        * Microscopy (e.g., electron, light, fluorescence)
        * Separation (e.g., centrifugation, gel filtration, PAGE, fluorescence-activated cell sorting [FACS])
        * Immunological (e.g., Western Blotting, immunohistochemistry, immunofluorescence)
2. Genetics and Molecular Biology (16–17%)
    1. Genetic foundations
        * Mendelian inheritance
        * Pedigree analysis
        * Prokaryotic genetics (transformation, transduction and conjugation)
        * Genetic mapping
    2. Chromatin and chromosomes
        * Nucleosomes
        * Karyotypes
        * Chromosomal aberrations
        * Polytene chromosomes
    3. Genome sequence organization
        * Introns and exons
        * Single-copy and repetitive DNA
        * Transposable elements
    4. Genome maintenance
        * DNA replication
        * DNA mutation and repair
    5. Gene expression and regulation in prokaryotes and eukaryotes: mechanisms
        * The operon
        * Promoters and enhancers
        * Transcription factors
        * RNA and protein synthesis
        * Processing and modifications of both RNA and protein
    6. Gene expression and regulation: effects
        * Control of normal development
        * Cancer and oncogenes
        * Whole genome expression (e.g., microarrays)
        * Regulation of gene expression by RNAi (e.g., siRNA)

    * Epigenetics
7. Immunobiology
    * Cellular basis of immunity
    * Antibody diversity and synthesis
    * Antigen-antibody interactions
8. Bacteriophages, animal viruses and plant viruses
    * Viral genomes, replication, and assembly
    * Virus-host cell interactions
9. Recombinant DNA methodology
    * Restriction endonucleases
    * Blotting and hybridization
    * Restriction fragment length polymorphisms
    * DNA cloning, sequencing and analysis
    * Polymerase chain reaction

II. ORGANISMAL BIOLOGY (33–34%)

* The structure, physiology, behavior and development of plants and animals are addressed.
* Topics covered include nutrient procurement and processing, gas exchange, internal transport, regulation of fluids, control mechanisms and effectors, and reproduction in autotrophic and heterotrophic organisms.
* Examples of developmental phenomena range from fertilization through differentiation and morphogenesis.
* Perceptions and responses to environmental stimuli are examined as they pertain to both plants and animals.
* Major distinguishing characteristics and phylogenetic relationships of selected groups from the various kingdoms are also covered.

1. Animal Structure, Function and Organization (10%)
    1. Exchange with environment
        * Nutrient, salt and water exchange
        * Gas exchange
        * Energy
    2. Internal transport and exchange
        * Circulatory and digestive systems
    3. Support and movement
        * Support systems (external, internal and hydrostatic)
        * Movement systems (flagellar, ciliary and muscular)
    4. Integration and control mechanisms
        * Nervous and endocrine systems
    5. Behavior (communication, orientation, learning and instinct)
    6. Metabolic rates (temperature, body size and activity)
2. Animal Reproduction and Development (6%)
    1. Reproductive structures
    2. Meiosis, gametogenesis and fertilization
    3. Early development (e.g., polarity, cleavage and gastrulation)
    4. Developmental processes (e.g., induction, determination, differentiation, morphogenesis and metamorphosis)
    5. External control mechanisms (e.g., photoperiod)
3. Plant Structure, Function and Organization, with Emphasis on Flowering Plants (7%)
    1. Organs, tissue systems, and tissues
    2. Water transport, including absorption and transpiration
    3. Phloem transport and storage
    4. Mineral nutrition
    5. Plant energetics (e.g., respiration and photosynthesis)
4. Plant Reproduction, Growth and Development, with Emphasis on Flowering Plants (5%)
    1. Reproductive structures
    2. Meiosis and sporogenesis
    3. Gametogenesis and fertilization
    4. Embryogeny and seed development
    5. Meristems, growth, morphogenesis and differentiation
    6. Control mechanisms (e.g., hormones, photoperiod and tropisms)
5. Diversity of Life (6%)
    1. Archaea
        * Morphology, physiology and identification
    2. Bacteria (including cyanobacteria)
        * Morphology, physiology, pathology and identification
    3. Protista
        * Protozoa, other heterotrophic Protista (slime molds and Oomycota) and autotrophic Protista
        * Major distinguishing characteristics
        * Phylogenetic relationships
        * Importance (e.g., eutrophication, disease)
    4. Fungi
        * Distinctive features of major phyla (vegetative, asexual and sexual reproduction)
        * Generalized life cycles
        * Importance (e.g., decomposition, biodegradation, antibiotics and pathogenicity)
        * Lichens
    5. Animalia with emphasis on major phyla
        * Major distinguishing characteristics
        * Phylogenetic relationships
    6. Plantae with emphasis on major phyla
        * Alternation of generations
        * Major distinguishing characteristics
        * Phylogenetic relationships

III. ECOLOGY AND EVOLUTION (33–34%)

* This section deals with the interactions of organisms and their environment, emphasizing biological principles at levels above the individual.
* Ecological and evolutionary topics are given equal weight.
* Ecological questions range from physiological adaptations to the functioning of ecosystems.
* Although principles are emphasized, some questions may consider applications to current environmental problems.

* Questions in evolution range from its genetic foundations through evolutionary processes to their consequences.
* Evolution is considered at the molecular, individual, population and higher levels.
* Principles of ecology, genetics and evolution are interrelated in many questions.
* Some questions may require quantitative skills, including the interpretation of simple mathematical models.

1. Ecology (16–17%)
    1. Environment/organism interaction
        * Biogeographic patterns
        * Physiological ecology
        * Temporal patterns (e.g., seasonal fluctuations)
    2. Behavioral ecology
        * Habitat selection
        * Mating systems
        * Social systems
        * Resource acquisition
    3. Population Structure and Function
        * Population dynamics/regulation
        * Demography and life history strategies
    4. Communities
        * Direct and indirect interspecific interactions
        * Community structure and diversity
        * Change and succession
    5. Ecosystems
        * Productivity and energy flow
        * Chemical cycling
2. Evolution (16–17%)
    1. Genetic variability
        * Origins (mutations, linkage, recombination and chromosomal alterations)
        * Levels (e.g., polymorphism and heritability)
        * Spatial patterns (e.g., clines and ecotypes)
        * Hardy-Weinberg equilibrium
    2. Evolutionary processes
        * Gene flow and genetic drift
        * Natural selection and its dynamics
        * Levels of selection (e.g., individual and group)
        * Trade-offs and genetic correlations
        * Natural selection and genome evolution
        * Synonymous vs. nonsynonymous nucleotide ratios
    3. Evolutionary consequences
        * Fitness and adaptation
        * Speciation
        * Systematics and phylogeny
        * Convergence, divergence and extinction
        * Coevolution
    4. History of life
        * Origin of prokaryotic and eukaryotic cells
        * Fossil record
        * Paleontology and paleoecology
        * Lateral transfer of genetic sequences

Chemistry:-

* The test consists of approximately 130 multiple-choice questions.
* A periodic table is printed in the test booklet as well as a table of information presenting various physical constants and a few conversion factors among SI units. Whenever necessary, additional values of physical constants are printed with the text of the question.
* Test questions are constructed to simplify mathematical manipulations. As a result, neither calculators nor tables of logarithms are needed. If the solution to a problem requires the use of logarithms, the necessary values are included with the question.
* The content of the test emphasizes the four fields into which chemistry has been traditionally divided and some interrelationships among the fields. Because of these interrelationships, individual questions may test more than one field of chemistry.
* Some examinees may associate a particular question with one field, whereas other examinees may have encountered the same material in a different field. For example, the knowledge necessary to answer some questions classified as testing organic chemistry may well have been acquired in analytical chemistry courses by some examinees.
* Consequently, the emphases of the four fields indicated in the following outline of material covered by the test should not be considered definitive.

I. ANALYTICAL CHEMISTRY — 15%

1. Data Acquisition and Use of Statistics — Errors, statistical considerations
2. Solutions and Standardization — Concentration terms, primary standards
3. Homogeneous Equilibria — Acid-base, oxidation-reduction, complexometry
4. Heterogeneous Equilibria — Gravimetric analysis, solubility, precipitation titrations, chemical separations
5. Instrumental Methods — Electrochemical methods, spectroscopic methods, chromatographic methods, thermal methods, calibration of instruments
6. Environmental Applications
7. Radiochemical Methods — Detectors, applications

II. INORGANIC CHEMISTRY — 25%

1. General Chemistry — Periodic trends, oxidation states, nuclear chemistry
2. Ionic Substances — Lattice geometries, lattice energies, ionic radii and radius/ratio effects
3. Covalent Molecular Substances — Lewis diagrams, molecular point groups, VSEPR concept, valence bond description and hybridization, molecular orbital description, bond energies, covalent and van der Waals radii of the elements, intermolecular forces
4. Metals and Semiconductors — Structure, band theory, physical and chemical consequences of band theory
5. Concepts of Acids and Bases — Brønsted-Lowry approaches, Lewis theory, solvent system approaches
6. Chemistry of the Main Group Elements — Electronic structures, occurrences and recovery, physical and chemical properties of the elements and their compounds

7. Chemistry of the Transition Elements — Electronic structures, occurrences and recovery, physical and chemical properties of the elements and their compounds, coordination chemistry
8. Special Topics — Organometallic chemistry, catalysis, bioinorganic chemistry, applied solid-state chemistry, environmental chemistry

III. ORGANIC CHEMISTRY — 30%

1. Structure, Bonding and Nomenclature — Lewis structures, orbital hybridization, configuration and stereochemical notation, conformational analysis, systematic IUPAC nomenclature, spectroscopy (IR and 1H and 13C NMR)
2. Functional Groups — Preparation, reactions, and interconversions of alkanes, alkenes, alkynes, dienes, alkyl halides, alcohols, ethers, epoxides, sulfides, thiols, aromatic compounds, aldehydes, ketones, carboxylic acids and their derivatives, amines
3. Reaction Mechanisms — Nucleophilic displacements and addition, nucleophilic aromatic substitution, electrophilic additions, electrophilic aromatic substitutions, eliminations, Diels-Alder and other cycloadditions
4. Reactive Intermediates — Chemistry and nature of carbocations, carbanions, free radicals, carbenes, benzynes, enols
5. Organometallics — Preparation and reactions of Grignard and organolithium reagents, lithium organocuprates, and other modern main group and transition metal reagents and catalysts
6. Special Topics — Resonance, molecular orbital theory, catalysis, acid-base theory, carbon acidity, aromaticity, antiaromaticity, macromolecules, lipids, amino acids, peptides, carbohydrates, nucleic acids, terpenes, asymmetric synthesis, orbital symmetry, polymers

IV. PHYSICAL CHEMISTRY — 30%

1. Thermodynamics — First, second, and third laws, thermochemistry, ideal and real gases and solutions, Gibbs and Helmholtz energy, chemical potential, chemical equilibria, phase equilibria, colligative properties, statistical thermodynamics
2. Quantum Chemistry and Applications to Spectroscopy — Classical experiments, principles of quantum mechanics, atomic and molecular structure, molecular spectroscopy
3. Dynamics — Experimental and theoretical chemical kinetics, solution and liquid dynamics, photochemistry

Computer Science:-

I. SOFTWARE SYSTEMS AND METHODOLOGY — 40%

A. Data organization

* Data types
* Data structures and implementation techniques

B. Program control and structure

* Iteration and recursion
* Procedures, functions, methods and exception handlers
* Concurrency, communication and synchronization

C. Programming languages and notation

* Constructs for data organization and program control
* Scope, binding and parameter passing
* Expression evaluation

D. Software engineering

* Formal specifications and assertions
* Verification techniques
* Software development models, patterns and tools

E. Systems

* Compilers, interpreters and run-time systems
* Operating systems, including resource management and protection/security
* Networking, Internet and distributed systems
* Databases
* System analysis and development tools

II. COMPUTER ORGANIZATION AND ARCHITECTURE — 15%

A. Digital logic design

* Implementation of combinational and sequential circuits
* Optimization and analysis

B. Processors and control units

* Instruction sets
* Computer arithmetic and number representation
* Register and ALU organization
* Data paths and control sequencing

C. Memories and their hierarchies

* Performance, implementation and management
* Cache, main and secondary storage
* Virtual memory, paging and segmentation

D. Networking and communications

* Interconnect structures (e.g., buses, switches, routers)
* I/O systems and protocols

* Synchronization

E. High-performance architectures

* Pipelining superscalar and out-of-order execution processors
* Parallel and distributed architectures

III. THEORY AND MATHEMATICAL BACKGROUND — 40%

A. Algorithms and complexity

* Exact and asymptotic analysis of specific algorithms
* Algorithmic design techniques (e.g., greedy, dynamic programming, divide and conquer)
* Upper and lower bounds on the complexity of specific problems
* Computational complexity, including NP-completeness

B. Automata and language theory

* Models of computation (finite automata, Turing machines)
* Formal languages and grammars (regular and context-free)
* Decidability

C. Discrete structures

Mathematical logic
Elementary combinatorics and graph theory
Discrete probability, recurrence relations and number theory

IV. OTHER TOPICS — 5%

Example areas include numerical analysis, artificial intelligence, computer graphics, cryptography, security and social issues.

Note: Students are assumed to have a mathematical background in the areas of calculus and linear algebra as applied to computer science.

Literature in English:-

1. Literary Analysis (40 – 55%)
   An ability to interpret given passages of prose and poetry. Such questions may involve recognition of conventions and genres, allusions and references, meaning and tone, grammatical structures and rhetorical strategies, and literary techniques.
2. Identification (15 – 20%)
   Recognition of date, author or work by style and/or content (for literary theory identifications see IV below).
3. Cultural and Historical Contexts (20 – 25%)
   Questions on literary, cultural and intellectual history as well as identification of author or work through a critical statement or biographical information. Also identification of details of character, plot or setting of a work.
4. History and Theory of Literary Criticism (10 – 15%)
   Identification and analysis of the characteristics and methods of various critical and theoretical approaches.

Mathematics:-

CALCULUS — 50%

Material learned in the usual sequence of elementary calculus courses — differential and integral calculus of one and of several variables — includes calculus-based applications and connections with coordinate geometry, trigonometry, differential equations and other branches of mathematics.

ALGEBRA — 25%

* Elementary algebra: basic algebraic techniques and manipulations acquired in high school and used throughout mathematics
* Linear algebra: matrix algebra, systems of linear equations, vector spaces, linear transformations, characteristic polynomials and eigenvalues and eigenvectors
* Abstract algebra and number theory: elementary topics from group theory, theory of rings and modules, field theory and number theory

ADDITIONAL TOPICS — 25%

* Introductory real analysis: sequences and series of numbers and functions, continuity, differentiability and integrability, and elementary topology of R and Rn
* Discrete mathematics: logic, set theory, combinatorics, graph theory and algorithms
* Other topics: general topology, geometry, complex variables, probability and statistics, and numerical analysis

The above descriptions of topics covered in the test should not be considered exhaustive; it is necessary to understand many other related concepts. Prospective test takers should be aware that questions requiring no more than a good precalculus background may be quite challenging; such questions can be among the most difficult questions on the test. In general, the questions are intended not only to test recall of information but also to assess test takers' understanding of fundamental concepts and the ability to apply those concepts in various situations.

Physics:-

1. CLASSICAL MECHANICS — 20%
   (such as kinematics, Newton's laws, work and energy, oscillatory motion, rotational motion about a fixed axis, dynamics of systems of particles, central forces and celestial mechanics, three-dimensional particle dynamics, Lagrangian and Hamiltonian formalism, noninertial reference frames, elementary topics in fluid dynamics)
2. ELECTROMAGNETISM — 18%
   (such as electrostatics, currents and DC circuits, magnetic fields in free space, Lorentz force, induction, Maxwell's equations and their applications, electromagnetic waves, AC circuits, magnetic and electric fields in matter)
3. OPTICS AND WAVE PHENOMENA — 9%
   (such as wave properties, superposition, interference, diffraction, geometrical optics, polarization, Doppler effect)

4. THERMODYNAMICS AND STATISTICAL MECHANICS — 10%
(such as the laws of thermodynamics, thermodynamic processes, equations of state, ideal gases, kinetic theory, ensembles, statistical concepts and calculation of thermodynamic quantities, thermal expansion and heat transfer)
5. QUANTUM MECHANICS — 12%
(such as fundamental concepts, solutions of the Schrödinger equation (including square wells, harmonic oscillators, and hydrogenic atoms), spin, angular momentum, wave function symmetry, elementary perturbation theory)
6. ATOMIC PHYSICS — 10%
(such as properties of electrons, Bohr model, energy quantization, atomic structure, atomic spectra, selection rules, black-body radiation, x-rays, atoms in electric and magnetic fields)
7. SPECIAL RELATIVITY — 6%
(such as introductory concepts, time dilation, length contraction, simultaneity, energy and momentum, four-vectors and Lorentz transformation, velocity addition)
8. LABORATORY METHODS — 6%
(such as data and error analysis, electronics, instrumentation, radiation detection, counting statistics, interaction of charged particles with matter, lasers and optical interferometers, dimensional analysis, fundamental applications of probability and statistics)
9. SPECIALIZED TOPICS — 9%
Nuclear and Particle physics (e.g., nuclear properties, radioactive decay, fission and fusion, reactions, fundamental properties of elementary particles), Condensed Matter (e.g., crystal structure, x-ray diffraction, thermal properties, electron theory of metals, semiconductors, superconductors), Miscellaneous (e.g., astrophysics, mathematical methods, computer applications)

Psychology:-

1. Learning (3–5%)
    1. Classical Conditioning
    2. Instrumental Conditioning
    3. Observational Learning, Modeling
    4. Theories, Applications and Issues
2. Language (3–4%)
    1. Units (phonemes, morphemes, phrases)
    2. Syntax
    3. Meaning
    4. Speech Perception and Processing
    5. Verbal and Nonverbal Communication
    6. Bilingualism
    7. Theories, Applications and Issues
3. Memory (7–9%)
    1. Working Memory
    2. Long-term Memory
    3. Types of Memory
    4. Memory Systems and Processes
    5. Theories, Applications and Issues
4. Thinking (4–6%)
    1. Representation (Categorization, Imagery, Schemas, Scripts)
    2. Problem Solving
    3. Judgment and Decision-making Processes
    4. Planning, Metacognition
    5. Intelligence
    6. Theories, Applications and Issues
5. Sensation and Perception (5–7%)
    1. Psychophysics, Signal Detection
    2. Attention
    3. Perceptual Organization
    4. Vision
    5. Audition
    6. Gustation
    7. Olfaction
    8. Somatosenses
    9. Vestibular and Kinesthetic Senses
    10. Theories, Applications and Issues
6. Physiological/Behavioral Neuroscience (12–14%)
    1. Neurons
    2. Sensory Structures and Processes
    3. Motor Structures and Functions
    4. Central Structures and Processes
    5. Motivation, Arousal, Emotion
    6. Cognitive Neuroscience
    7. Neuromodulators and Drugs
    8. Hormonal Factors
    9. Comparative and Ethology
    10. States of Consciousness
    11. Theories, Applications and Issues

II. SOCIAL SUBSCORE — 43%

1. Clinical and Abnormal (12–14%)
    1. Stress, Conflict, Coping
    2. Diagnostic Systems
    3. Assessment
    4. Causes and Development of Disorders
    5. Neurophysiological Factors
    6. Treatment of Disorders
    7. Epidemiology
    8. Prevention
    9. Health Psychology
    10. Culture and Gender Issues

11. Theories, Applications and Issues

2. Lifespan Development (12–14%)
    1. Nature-Nurture
    2. Physical and Motor
    3. Perception and Cognition
    4. Language
    5. Intelligence
    6. Social and Personality
    7. Emotion
    8. Socialization, Family and Cultural Influences
    9. Theories, Applications and Issues
3. Personality (3–5%)
    1. Theories
    2. Structure
    3. Assessment
    4. Personality and Behavior
    5. Applications and Issues
4. Social (12–14%)
    1. Social Perception, Cognition, Attribution, Beliefs
    2. Attitudes and Behavior
    3. Social Comparison, Self
    4. Emotion, Affect and Motivation
    5. Conformity, Influence and Persuasion
    6. Interpersonal Attraction and Close Relationships
    7. Group and Intergroup Processes
    8. Cultural and Gender Influences
    9. Evolutionary Psychology, Altruism and Aggression
    10. Theories, Applications and Issues

III. OTHER AREAS — 17%

1. General (4–6%)
    1. History
    2. Industrial-Organizational
    3. Educational
2. Measurement and Methodology (11–13%)
    1. Psychometrics, Test Construction, Reliability, Validity
    2. Research Designs
    3. Statistical Procedures
    4. Scientific Method and the Evaluation of Evidence
    5. Ethics and Legal Issues
    6. Analysis and Interpretation of Findings