General Aptitude Syllabus		
Section	**Topics**	**No. of Questions**
1. Quantitative Aptitude:	Number Systems, Percentage, Profit and Loss, Simple and Compound Interest, Ratio and Proportion, Time, Speed, and Distance, Time and Work, Average, Algebra, Geometry, Mensuration, Data Interpretation.	6
2. Logical Reasoning:	Analogy , Classification, Series Completion, Coding-Decoding, Blood Relations, Direction Sense Test, Logical Venn Diagrams, Alphabet Test, Number Ranking and Time Sequence Test, Mathematical Operations, Logical Sequence of Words, Arithmetical Reasoning, Inserting the Missing Character, Data Sufficiency.	6
3. Verbal Ability:	Reading Comprehension, Vocabulary, Synonyms and Antonyms, Fill in the Blanks, Error Correction, Sentence Correction, Para-jumbles, Sentence, Completion, Idioms and Phrases, One-word Substitution.	6
4. General Awareness:	Current Affairs (National and International), History, Geography, Indian Polity, Indian Economy, Science and Technology, Environmental Studies, Important Dates, Events and Persons, Books and Authors, Awards and Honors, Sports, Abbreviations, Indian Constitution.	6
5. Data Interpretation:	Tabular Data Interpretation, Bar Graphs, Line Graphs, Pie Charts, Caselet Data Interpretation, Data Sufficiency.	6

Pharmacy Syllabus		
Section	**Topics**	**No. of Questions**
Section 1: Biochemistry & Immunology	• **Biochemical Techniques:** Principles and applications of various biochemical techniques such as chromatography (paper chromatography, TLC, column chromatography, HPLC), electrophoresis, centrifugation, spectroscopy (UV-Vis, fluorescence, NMR, mass spectrometry), immunochemical techniques (ELISA, immunoblotting), PCR, DNA sequencing, protein purification techniques. • **Biomolecules:** Structure, properties, and functions of carbohydrates, lipids, proteins, and nucleic acids. • **Enzymology:** Classification, mechanism of action, kinetics (Michaelis-Menten kinetics, allosteric enzymes), enzyme inhibition, regulation of enzyme activity. • **Metabolism:** Overview of metabolism: Anabolism and catabolism. Carbohydrate metabolism: Glycolysis, gluconeogenesis, pentose phosphate pathway, glycogen metabolism. Lipid metabolism: Fatty acid oxidation and synthesis, cholesterol metabolism. Amino acid metabolism: Protein catabolism, urea cycle, biosynthesis of amino acids. Nucleotide metabolism: Purine and pyrimidine metabolism. Bioenergetics: ATP synthesis, oxidative phosphorylation, electron transport chain. • **Biochemical Genetics:**Mendelian genetics and its application in biochemistry. Gene expression: Transcription, translation, regulation of gene expression (transcriptional and post-transcriptional regulation). Recombinant DNA technology: Gene cloning, PCR, DNA sequencing, gene expression vectors. • **Hormones and Signal Transduction:**Overview of hormones and their functions. Mechanisms of hormone action: Receptor-mediated signal transduction pathways (G-protein coupled receptors, receptor tyrosine kinases, intracellular receptors). Second messengers: cAMP, IP3, DAG, calcium ions. • **Biochemical Basis of Diseases:** Molecular basis of genetic disorders, metabolic disorders, and cancer. Biomarkers and diagnostic tests for various diseases. Therapeutic interventions targeting biochemical pathways in diseases. • **Immunochemistry:** Structure and function of antibodies and antigens. Immune response: Innate and adaptive immunity, antigen presentation, humoral and cellular immunity. Immunological techniques: ELISA, immunoblotting, immunoprecipitation. • **Introduction to Immunology:** Historical perspectives and milestones in immunology. Basic concepts: Immune system, immunity, antigens, antibodies, and antigens-antibody interactions. • Types of immunity: Innate immunity and adaptive immunity. • **Innate Immunity:** Components of the innate immune system: Physical barriers, cellular components (macrophages, neutrophils, dendritic cells), and soluble factors (complement system, cytokines). Recognition of pathogens by pattern recognition receptors (PRRs). Phagocytosis and intracellular killing mechanisms. • **Adaptive Immunity:** Cells of adaptive immunity: T cells, B cells, and antigen-presenting cells (APCs). Antigen recognition and activation of lymphocytes: Major histocompatibility complex (MHC), T cell receptor (TCR), and B cell receptor (BCR). • T cell activation and differentiation: Helper T cells (Th1, Th2, Th17), cytotoxic T cells (CTLs), and regulatory T cells (Tregs).	10

	• B cell activation, antibody production, and class switching. • **Humoral Immune Response:** Structure and function of antibodies: Immunoglobulin classes (IgG, IgM, IgA, IgD, IgE), antibody diversity, and antibody-mediated effector functions. Generation of antibody diversity: Somatic recombination, somatic hypermutation, and affinity maturation. Mechanisms of antibody-mediated immunity: Neutralization, opsonization, complement activation, and antibody-dependent cellular cytotoxicity (ADCC). • **Cell-Mediated Immune Response:** T cell activation and effector functions: Cytokine production, T cell proliferation, and differentiation into effector and memory T cells. T cell-mediated cytotoxicity: Recognition of target cells, perforin-granzyme pathway, and Fas-Fas ligand pathway. Role of T cells in immune regulation and tolerance. • **Immune System Development and Tolerance:** Development of lymphoid organs: Thymus, bone marrow, and secondary lymphoid tissues (spleen, lymph nodes). Central and peripheral tolerance mechanisms: Negative selection in thymus, peripheral deletion, anergy, and regulatory T cells. • **Antigen Processing and Presentation:** Intracellular antigen processing pathways: Endogenous pathway (MHC class I) and exogenous pathway (MHC class II). Antigen presentation by professional antigen-presenting cells (APCs): Dendritic cells, macrophages, and B cells. • **Hypersensitivity and Autoimmunity:** Types of hypersensitivity reactions: Type I (immediate), Type II (cytotoxic), Type III (immune complex-mediated), and Type IV (delayed-type). Mechanisms of autoimmune diseases: Loss of self-tolerance, molecular mimicry, and genetic predisposition. Examples of autoimmune diseases: Rheumatoid arthritis, systemic lupus erythematosus (SLE), multiple sclerosis, and type 1 diabetes. • **Vaccines and Immunotherapy:** Principles of vaccination: Types of vaccines (live attenuated, inactivated, subunit, conjugate, and DNA vaccines), adjuvants, and vaccination strategies. Immunotherapeutic approaches: Monoclonal antibodies, cytokine therapy, adoptive T cell transfer, and immune checkpoint inhibitors. • **Immunological Techniques:** Immunological assays: ELISA (enzyme-linked immunosorbent assay), western blotting, immunoprecipitation, and flow cytometry. Molecular techniques in immunology: Polymerase chain reaction (PCR), DNA sequencing, and gene expression analysis.	
Section 2 : Micro & Molecular Biology	• **Microbial Taxonomy and Diversity:** Classification and nomenclature of microorganisms: Bacteria, Archaea, Fungi, Protozoa, Algae, and Viruses. Methods for microbial identification and characterization. Microbial diversity in different environments: Soil, water, air, extreme environments. • **Microbial Structure and Function:** Bacterial cell structure: Cell wall, plasma membrane, cytoplasm, ribosomes, nucleoid, appendages (flagella, pili, fimbriae), endospores. Structure and function of viral particles: Capsid, envelope, genome types (DNA, RNA), replication cycles (lytic and lysogenic). Structure and function of eukaryotic microorganisms: Fungi, Protozoa, Algae. • **Microbial Physiology:** Metabolism: Microbial nutrition, energy generation, catabolism, anabolism, fermentation, respiration, photosynthesis. Growth kinetics: Growth curve, factors affecting microbial growth (temperature, pH, osmotic pressure, oxygen). Bacterial genetics: Gene transfer mechanisms (transformation, transduction, conjugation), plasmids, mutations, horizontal gene transfer. • **Medical Microbiology:** Pathogenesis of infectious diseases: Virulence factors, host-pathogen interactions, mechanisms of infection. Microbial diseases: Bacterial, viral, fungal, and protozoal infections, epidemiology, prevention, and control measures. Antimicrobial agents: Antibiotics, antivirals, antifungals, mechanisms of action, resistance mechanisms. • **Industrial Microbiology:** Microbial biotechnology: Microbial enzymes, biofuel production, bioremediation, biotransformation, biosurfactants, biofertilizers. • **Microbial Biotechnology:** Genetic engineering of microorganisms: Recombinant DNA technology, gene cloning, expression vectors, gene editing tools (CRISPR-Cas), synthetic biology. Microbial production of biomolecules: Recombinant proteins, vaccines, antibiotics, industrial enzymes. • **Microbial Genetics and Genomics:** Microbial genome structure and organization. Comparative genomics, metagenomics, and systems biology approaches in microbial research. • **DNA Structure and Function:** DNA replication: Enzymes involved, replication fork, leading and lagging strands, replication origins, and termination. DNA repair mechanisms: Mismatch repair, base excision repair, nucleotide excision repair, homologous recombination, non-homologous end joining. DNA packaging: Chromatin structure, nucleosomes, histones, chromatin remodeling complexes.	10

	• **Transcription:** RNA synthesis: RNA polymerase, transcription factors, promoter elements, enhancers, terminators. Transcriptional regulation: Operons, transcriptional activators and repressors, transcriptional co-regulators, RNA interference. • **RNA Processing:** mRNA processing: Capping, splicing, polyadenylation. tRNA and rRNA processing. • **Translation:**Ribosome structure and function. tRNA charging, initiation, elongation, termination. Post-translational modifications: Protein folding, glycosylation, phosphorylation, proteolysis. • **Gene Regulation:** Mechanisms of gene regulation in prokaryotes and eukaryotes. Regulatory sequences, transcriptional regulators, epigenetic modifications. Transcriptional and post-transcriptional regulation of gene expression. • **Genomics and Proteomics:** Genome organization: Gene structure, introns and exons, repetitive DNA elements. Comparative genomics, functional genomics, and metagenomics. Proteome analysis: Protein separation techniques, mass spectrometry, protein-protein interactions. • **Recombinant DNA Technology:** Gene cloning: Restriction enzymes, DNA ligation, vectors (plasmids, phages, cosmids), transformation, selection, screening. Polymerase Chain Reaction (PCR) and its variations. DNA sequencing methods: Sanger sequencing, next-generation sequencing (NGS), and sequencing by synthesis. • **Gene Expression Systems:** Expression vectors and hosts: Bacterial, yeast, insect, and mammalian expression systems. Protein expression and purification techniques.	
Section 3: Cell Biology, Genetics and Genomics	• **Cell Structure and Function:** Cell theory: Historical perspective, modern cell theory. Cellular compartments: Structure and function of cell organelles (nucleus, endoplasmic reticulum, Golgi apparatus, mitochondria, chloroplasts, lysosomes, peroxisomes). Cytoskeleton: Microtubules, microfilaments, intermediate filaments, their structure, function, and dynamics. Cell membrane: Structure, fluid mosaic model, membrane proteins, membrane transport (passive and active transport), cell-cell interactions, cell junctions. • **Cell Cycle and Division:** Cell cycle phases: Interphase (G1, S, G2), mitosis, cytokinesis. Regulation of the cell cycle: Checkpoints, cyclins, cyclin-dependent kinases (CDKs), tumor suppressor genes. Cell division: Mitosis, meiosis, comparison between mitosis and meiosis, gametogenesis. • **Cell Signaling:** Types of cell signaling: Endocrine, paracrine, autocrine, juxtacrine. Signal transduction pathways: Receptor-mediated signaling, intracellular signaling cascades (e.g., G-protein coupled receptors, receptor tyrosine kinases). Second messengers: cAMP, cGMP, IP3, DAG, calcium ions. Signaling molecules: Growth factors, cytokines, hormones. • **Cellular Energetics:** Cellular respiration: Glycolysis, citric acid cycle (Krebs cycle), oxidative phosphorylation, electron transport chain. Photosynthesis: Light-dependent and light-independent reactions, Calvin cycle, chloroplast structure and function. Energy metabolism: ATP synthesis, energy storage and utilization, metabolic pathways (anabolism and catabolism). • **Cellular Membrane Dynamics:** Membrane trafficking: Endocytosis (phagocytosis, pinocytosis, receptor-mediated endocytosis), exocytosis, vesicle transport. Membrane fusion and fission: Mechanisms and regulation. Membrane remodeling: Lipid rafts, membrane curvature, membrane-associated proteins. • **Cellular Adhesion and Motility:** Cell adhesion molecules (CAMs): Integrins, selectins, cadherins. Cell migration: Mechanisms of cell motility, cytoskeletal dynamics in cell migration (lamellipodia, filopodia), extracellular matrix (ECM) interactions. Cell-cell and cell-matrix adhesion: Role in tissue development, wound healing, and cancer metastasis. • **Cell Differentiation and Stem Cells:** Stem cell biology: Types of stem cells (embryonic stem cells, adult stem cells, induced pluripotent stem cells), stem cell niches, stem cell markers. Cell fate determination: Signaling pathways involved in cell differentiation, transcription factors, epigenetic regulation. Tissue regeneration and repair: Role of stem cells in tissue homeostasis and regeneration. • **Cellular Responses to Environmental Stimuli: Cellular stress responses:** Heat shock response, unfolded protein response, oxidative stress response. Apoptosis and cell death: Mechanisms of programmed cell death, caspase activation, apoptotic signaling pathways. • **Molecular Genetics:** DNA structure and replication: Double helix model, DNA replication mechanisms (semi-conservative, conservative, dispersive). DNA repair mechanisms: Mismatch repair, base excision repair, nucleotide excision repair. DNA recombination and repair: Homologous recombination, site-specific recombination, transposition. DNA packaging: Chromatin structure, nucleosomes, histone modifications, chromatin remodeling.	10

	• **Gene Expression and Regulation:** Transcription: RNA polymerase, transcription factors, promoters, enhancers, transcriptional regulation (activators, repressors). RNA processing: Splicing, capping, polyadenylation, RNA editing. Translation: Ribosome structure, initiation, elongation, termination, regulation of translation. • **Genomics:** Genome organization: Gene structure, introns and exons, gene families, repetitive sequences. Comparative genomics: Genome evolution, orthologs, paralogs, synteny, genome duplication events. • **Genetic Engineering and Biotechnology:** Recombinant DNA technology: Gene cloning, expression vectors, gene editing tools (CRISPR-Cas), synthetic biology. Genetic manipulation techniques: Gene knockout, gene knock-in, gene silencing (RNA interference). • **Genome Editing and Gene Therapy:** CRISPR-Cas9 system: Mechanism, applications in genome editing and gene therapy. Gene therapy approaches: Gene addition, gene correction, gene silencing, ex vivo and in vivo gene therapy.	
Section 4: Pharmaceutical Biotechnology	• **Introduction to Pharmaceutical Biotechnology :** Overview of biotechnology applications in the pharmaceutical industry. Importance and impact of biopharmaceuticals. Regulatory aspects and ethical considerations in pharmaceutical biotechnology. • **Recombinant DNA Technology:** Techniques for gene cloning, including restriction enzymes, vectors, and gene libraries. Gene expression systems: prokaryotic and eukaryotic hosts, expression vectors, and promoters, Strategies for recombinant protein production and purification. Monoclonal Antibodies and Therapeutic Proteins Production of monoclonal antibodies: hybridoma technology and recombinant antibody techniques. Therapeutic proteins: insulin, growth factors, cytokines, and hormones. Purification and characterization of therapeutic proteins. • **Vaccine Technology :** Types of vaccines: live attenuated, inactivated, subunit, DNA, and vector-based vaccines. Vaccine production methods: cell culture, recombinant technology, and adjuvants. Vaccine formulation, stability, and delivery systems. • **Drug Delivery Systems :** Principles of drug delivery: routes of administration, pharmacokinetics, and pharmacodynamics. Nanotechnology in drug delivery: nanoparticles, liposomes, and micelles. Targeted drug delivery systems and site-specific drug release mechanisms. • **Pharmacogenomics and Personalized Medicine :** Role of genomics in drug discovery and development. Pharmacogenetics: genetic variations and drug response. Implementation of personalized medicine in clinical practice. • **Regulatory Affairs and Quality Control :** Regulatory requirements for biopharmaceutical products: FDA, EMA, and ICH guidelines. Good Manufacturing Practices (GMP) and quality control standards.Quality assurance in biopharmaceutical manufacturing. Emerging Trends in Pharmaceutical Biotechnology • **Biopharmaceuticals** for rare diseases and orphan drugs. Bioprospecting and natural product discovery. Future directions in precision medicine and biopharmaceutical innovation.	10
Section 5: Pharmaceutics & Pharmacology	• **Physical Pharmacy-** Micromeritics, Surface and interfacial tension, Rheology, Evaporation, Distillation, Corrosion, Dehumidification and humidification control. • **Biopharmaceutics & Pharmacokinetics-** Mechanisms of absorption, factors affecting absorption, distribution, plasma protein binding, factors affecting drug distribution, biotransformation, excretion, bioavailability, bioequivalence, methods of determining bioavailability, methods for enhancement of bioavailability, pharmacokinetic parameters, biopharmaceutic classification system, prodrugs. • **Pharmaceutical Engineering-** Flow of fluids, size reduction and size separation, drying, mixing, filtration, centrifugation. • **Cosmetic Technology-** Lipsticks, shampoo, nail preparations, dentifrices • **Dispensing Pharmacy-** Prescription, posology, proof spirit • **Pharmaceutical Technology-** Preformulation studies, dosage forms [tablet. Capsule, suspension, emulsions, ophthalmic preparation, aerosols etc.], Pharmaceutical packaging, novel drug delivery system, control drug delivery system • **Pharmacology-** General pharmacology, pharmacokinetics, pharmacodynamics, adverse drug reaction, drug acting on ANS, CNS, endocrine system, PNS, cardiovascular system, gastrointestinal drugs, drug affecting blood and blood formation, antimicrobial agents and antineoplastic agents.	10

	• **Human Anatomy & Physiology-** Cell physiology, blood, respiratory system, nervous system, skeletal system, excretory system, endocrine glands, reproductive system, circulatory system, lymphatic system • **Pathophysiology-** Cell injury and adaptation, inflammation and repair, disorders of homeostasis, infectious diseases.	
Section 6: Pharmaceutical Chemistry	• **Biochemistry-** Bioenergetics, Enzymes and vitamins, Metabolism of Carbohydrates, Metabolism of lipids, Biological Oxidation, Metabolism of Proteins, Nucleic acid, Organ Function test, Hormones • **Organic Chemistry- I**mportant name reactions, aromatic compounds, Aliphatic compounds, isomerism • **Inorganic Chemistry-** Inorganic compounds [GIT agents, Topical agents, dental products, antioxidants], limits tests, Radiopharmaceuticals • **Medicinal Chemistry-** Drug acts on autonomic nervous system, central nervous system, cardiovascular system, peripheral nervous system, respiratory system, hormones and related drugs, diuretics, autocoids and antimicrobial agents • **Pharmaceutical Analysis-** Spectroscopy [UV, IR, NMR, MASS], Chromatography [HPLC, Adsorption chromatography, Partition chromatography, Paper chromatography, thin layer chromatography, Ion exchange chromatography, Gas chromatography], volumetric analysis and electrochemical method of analysis	10
Section 7 : Pharmacognosy, Phytochemistry, Pharmaceutical Jurisprudence and Hospital & Clinical Pharmacy	• **Pharmacognosy-** Alkaloids, glycosides, terpenes, steroids, bioflavonoids, tissue culture, pharmacognosy of some plants [senna leaves, digitalis leaves, cinnamon, rauwolfia, ergot, opium, clove, belladonna, ginseng]. • Different legislations Acts, schedules to the rules, manufacture of drugs, wholesale and retail sale of the drugs**,** offences and penalties, labelling, and packing of drugs, drug inspectors, different forms for manufacture, sale, repackageing and import of drugs, the Pharmacy Act, Pharmacy Council of India, education regulations, State Pharmacy Councils, registration of pharmacists • Classification of hospitals, therapeutic drug monitoring, adverse drug reaction, dosage regimens.	10