PAPER-1 (PHYSICS & CHEMISTRY)

PHYSICS

Measurement : Dimensional analysis and error estimation, dimension compatibility and significant figures.

Motion in one dimension : Average velocity, instantaneous velocity, one dimensional motion with constant accelerations, freely falling bodies.

Laws of Motion : Force and inertia, Newton's laws of motion and their significance.

Motion in two dimensions : Projectile motion, uniform circular motion, tangential and radial acceleration in curve-linear motion, relative motion and relative acceleration.

Work, Power and Energy : Work done by a constant and variable forces, kinetic and potential energy, power, conservative and non conservative forces, conservation of energy, gravitational energy, work energy theorem, potential energy stored in a spring.

Linear Momentum & Collisions : Linear momentum and impulse, conservation of linear momentum for two particle system, collisions, collision in one dimension, collision in two dimension, rocket propulsion.

Rotation of a rigid body about a fixed axis : Angular velocity and angular acceleration, rotational kinematics, rotational motion with constant angular acceleration relationship between angular and linear quantities, rotational energy, moment of inertia for a ring, rod, spherical shell, sphere and plane lamina, torque and angular acceleration, work and energy in rotational motion, rolling motion of a solid sphere and cylinder.

Gravitation : Gravitational field, Kepler's laws and motion of planets, planetary and satellite motion, geostationary satellite.

Oscillatory motion : Harmonic motion, oscillatory motion of mass attached to a spring, kinetic and potential energy, Time Period of a simple pendulum, comparing simple and harmonic motion with uniform circular motion, forced oscillations, damped oscillation and resonance.

Mechanics of solids and fluids : States of matter young's modulus, bulk modulus, shear modulus of rigidity, variations of pressure with depth, Buoyant forces and Archimedes Principle,

Pascal's law, Bernoulli's theorem and its application, surface energy, surface tension, angle of contact, capillary rise, coefficient of viscosity, viscous force, terminal velocity, Stoke's law, stream line motion, Reynold's numbers.

Heat and thermodynamics : First law of thermodynamics, specify heat of an ideal gas at constant volume and constant pressure, relation between them, thermodynamics process (reversible, irreversible, isothermal, adiabatic), second law of thermodynamics, concept of entrophy and concept of absolute scale, efficiency of a Carnot engine, thermal conductivity, Newton's law of cooling, black body radiation, Wien's displacement law, Stefan's law.

Wave : Wave motion, phase, amplitude and velocity of wave, Newton's formula for longitudinal waves, propagation of sound waves in air, effect of temperature and pressure on velocity of sound, Laplace's correction, Principle of superposition, formation of standing waves, standing waves in strings and pipes, beats, Doppler's effect.

Electrostatics : Coulomb's law, electric field and potential due to point charge, dipole and its field along the axis and perpendicular to axis, electric flux, Gauss's theorem and its applications to find the field due to infinite sheet of charge, and inside the hallow conducting sphere, capacitance, parallel plate capacitor with air and dielectric medium between the Plates, series and parallel combination of capacitors, energy of a capacitor, displacement currents.

Current Electricity : Concept of free and bound electrons, drift velocity and mobility, electric current, Ohm's law, resistivity, conductivity, temperature dependency of resistance, resistance in series and parallel combination, Kirchoff's law and their application to network of resistances, principle of potentiometer, effect of temperature on resistance and its application.

Magnetic Effect of Current : Magnetic field due to current, Bio-Savart's law, magnetic field due to solenoid, motion of charge in a magnetic field, force on a current carrying conductors and torque on current loop in a magnetic field, magnetic flux, forces between two parallel current carrying conductors, moving coil galvanometer and its conversion into ammeter and voltmeter.

Magnetism in Matter : The magnetization of substance due to orbital and spin motions of electrons, magnetic moment of atoms, diamagnetism, paramagnetism, ferromagnetism, earth's magnetic field and its components and their measurement.

Electromagnetic Induction : Induced e.m.f., Faraday's laws, Lenz's law, electromagnetic induction, self and mutual induction, B-H curve, hysisteresis loss and its importance, eddy currents.

Ray Optics and optical instruments : Sources of light, luminous intensity, luminous flux,

illuminance, photometry, wave nature of light, Huygen's theory for propagation of light and rectilinear propagation of light, reflection of light, total internal reflection, reflection and refraction at spherical surfaces, focal length of a combination of lenses, spherical and chromatic aberration and their removal, reflection and dispersion of light due to a prism, simple and compound microscope, reflecting and refracting telescope, magnifying power and resolving power.

Wave Optics : Coherent and incoherent sources of light, interference, young's double slit experiment diffraction due to a single slit, lineraly polarized light, Polaroid.

Modern Physics : Photo-electric equation, matter waves, quantization, Planck's hypothesis, Bohr's model of hydrogen atom and its spectra, ionisation potential, Rydberg constant, solar spectrum and Fraunhofer lines, fluorescence and phosphorescence, X-Rays and their productions, characteristics and continuous spectra.

Nuclear Instability, radioactive decay laws, Emission of a, ß, ? rays, Mass - defect, Mass Energy equivalence, Nuclear Fission Nuclear Reactors, Nuclear Fusion.

Classification of conductors, Insulators and semiconductors on the basis of energy bands in solids, PN junction, PN Diode, junction Transistors, Transistors as an amplifier and Oscillators.

Principles of Logic Gates (AND, OR and NOT) Analog Vs Digital communication, Difference between Radio and television, Signal propagation, Principle of LASER and MASER, Population Inversion, Spontaneous and stimulated Emission.

CHEMISTRY

Atomic Structure : Bohr's concept. Quantum numbers, Electronic configuration, molecular orbital theory for homonuclear molecules, Pauli's exclusion principle.

Chemical Bonding : Electrovalency, co-valency, hybridization involving s,p and d orbitals hydrogen bonding.

Redox Reactions : Oxidation number, oxidising and reducing agents, balancing of equations.

Chemical Equilibrium and Kinetics : Equilibrium constant (for gaseous system only) Le Chaterlier's principle, ionic equilibrium, Ostwald's dilution law, hydrolysis, pH and buffer solution, solubility product, common-ion effect, rate constant and first order reaction.

Acid-Base Concepts : Bronsted Lowry & Lewis.

Electrochemistry : Electrode potential and electro-chemical series.

Catalysis : Types and applications.

Colloids : Types and preparation, Brownian movement, Tyndall effect, coagulation and peptization.

Colligative Properties of Solution : Lowering of vapour pressure, Osmotic pressure, depression of freezing point elevation of boiling point, determination of molecular weight.

Periodic Table : Classification of elements on the basis of electronic configuration, properties of sp and d block elements, ionization potential, electronegativity & electron affinity.

Preparation and Properties of the following : Hydrogen perioxide, copper sulphate, silver nitrate, plaster of paris, borax, Mohr's salt, alums, white and red lead, microcosmic salt and bleaching powder, sodium thiosulphate.

Thermochemistry : Exothermic & endothermic reactions Heat of reaction, Heat of combustion & formation, neutralisation, Hess's law.

General Organic Chemistry : Shape of organic compounds, Inductive effect, mesomeric effect, electrophiles & nucleophiles, Reaction intermediates : carboniumion, carbanions & free radical, Types of organic reaction, Cannizzaro Friedel Craft, Perkin, Aldol condensation.

Isomerism : Structural, Geometrical & Optical

IUPAC : Nomenclature of simple organic compounds.

Polymers : Addition & condensation polymers

Carbohydrates : Monosaccharides

Preparation and Properties of the Followings : Hydrocarbons, monohydric alcohols, aldehydes, ketones, monocarboxylic acids, primary amines, benzene, nitrobenzene, aniline, phenol, benzaldehyde, benzoic acid, Grignard Reagent.

Solid State : Structure of simple ionic compounds, Crystal imperfections (point defects only), Born-Haber cycle.

Petroleum : Important industrial fractions, cracking, octane number, anti knocking compounds.

PAPER - 2 (MATHEMATICS)

Algebra : Sets relations & functions, De-Morgan's Law, Mapping Inverse relations, Equivalence relations, Peano's axioms, Definition of rationals and integrals through equivalence relation, Indices and surds, solutions of simultaneous and quadratic equations, A.P., G.P. and H.P., Special sums i.e. Sn2 and Sn3 (nSn), Partial fraction, Binomial theorem for any index, exponential series, Logarithm and Logarithmic series. Determinants and their use in solving simultaneous linear equations, Matrices, Algebra of Matrices, Inverse of a Matrix, Use of Matrix for solving equations.

Probability : Definition, Dependent and independent events, Numerical problem on addition and multiplication, theorem of probability.

Trigonometry : Identities, Trigonometric equations, properties of triangles, solution of triangles, heights and distances, Inverse function, Complex numbers and their properties, Cube roots of unity, De- Moivre's theorem.

Co-ordinate Geometry : Pair of straight lines, Circles, General equation of second degree, parabola, ellipse and hyperbola, tracing of conics.

Calculus : Limits & continuity of functions, Differentiation of function of function, tangents & normal, Simple examples of Maxima, Indeterminate forms, Integration of function by parts, by substitution and by partial fraction, definite integral, application to volumes and surfaces of frustums of sphere, cone and cylinder. Differential equations of first order and of first degree.

Vectors : Algebra of vectors, scalar and vector products of two and three vectors and their applications.

Dynamics: Velocity, composition of velocity, relative velocity, acceleration, composition of accelerations, Motion under gravity, Projectiles, Laws of motion, Principles of conservation of momentum and energy, direct impact of smooth bodies.

Statics : Composition of coplanar, concurrent and parallel forces moments and couples resultant of set of coplanar forces and condition of equilibrium, determination of centroid in simple cases, Problems involving friction.

PAPER - 3 (BIOLOGY)
ZOOLOGY

Origin of Life: Oparin's theory, Miller's Experiment, Viruses - structure, properties, distribution, classification and pathogenesis (Eg. AIDS, CANCER), Viroids & Prions, Biotic balance.

Organic Evolution : Relationship among organisms and Evidences of organic Evolution - Principles of Evolution - Lamarkism, Darwinism and Speciation.

Mechanism of Organic Evolution : Variations - Definition, causes and types, Mutations (Principles of Hugo de'veries), Role of mutations in speciation. Evolution through ages and human evolution.

Human Genetics and Eugenics : Human hereditary traits, study of Twins, A.B.O. blood groups and their inheritance, Rh-factor, Sex determination. Chromosomal abberrations, Important human syndromes, Sex linked characters and their inheritance, Applied Genetics - eugenics, euthenics, euphenics & I.Q. Test.

Applied Biology : Wild life of India - Endagenered species : Biosphere Reserves, National Parks and sanctuaries, Project Tiger, Conservation of wild life, Bio-energy, Poultry, Fisheries (edible fishes), Human Population, Population explosion, problems & control. Test-Tube babies, & Amniocentasis, Application of Biotechnology in human welfare. Human Aging.

Mammalian Anatomy (Eg. Rabbit) : Reproductive system (excluding embryonic development) Osteology, structure and organization of different systems.

Animal Physiology :

(A) *Animal Nutrition :* Food, Balanced diet, Nutritional imbalances and deficiency diseases, Digestion, Absorption, Assilmilation of food, (comparison between human and Rabbit).

(B) *Animal Excretion and Osmoregulation :* Chemical nature of excretory products in various animals, Physiology of excretion, Function of liver and Kidney (Homeostatic regulatory functions of kidneys), Formation of urine, Osmoregulation by kidneys.

(C) *Respiratory System :* Exchange and transport of gases (O2 and Co2) factors affecting O2 and Co2 transport, Cellular respiration, different lung volumes, breathing and sound production.

(D) Nervous System : Central, autonomic and peripheral nervous system, Receptors, Effectors, Reflex-action. Nature and conduction of Nerve-impulses, Synapse, Sense organs - Structure & working of Eye & Ear, Biochemistry of vision and taste buds

(*E) Endocrine System :* Different endocrine glands and Hormones - definition, types, characteristics and their functions, (in relation to human beings), Hormonal disorders and pheromones.

(F) Circulatory System : Circulation of body fluids - Blood and lymph, Open and closed vascular systems, Structure and working physiology of Heart, Comparison between arteries and veins, Lymphatic system.

(G) Animal Diversity : Classification of Animal kingdom (Based on Storar & Eusinger), Characteristic feature of different phyla and classes with examples.

Detailed studies of following :

(a) Protozoa

(i) Amoeba- Habit & Habitat, structure, locomotion, reproduction, Osmoregulation, Parastic amoebae-Entamoeba histolytica and Entamoeba gengivalis, structure, diseases caused by them and their control measures.

(ii) Plasmodium vivax-life-cycle, malaria therapy and control.

(iii) Protozoan and diseases

(b) Porifera: A simple sponge (Leucosolenia) : Detailed study of structure & physiology, Sponge industry.

(c) Coelenterata : Hydra - Habit and Habitat, morphology, tissue differentiation in relation to physiological division of labour and regeneration.

(d) Aschelminthes : Ascaris - morphology, life-cycle, therapy and control.

(e) Annelida : Pheretima posthuma - Bionomics and economic importance.

(f) Arthropoda : (Periplanata) : Structure - external and internal. Comparision between Periplanata and Blatta.

(i) Housefly & Mosquito : structure and life - cycle.

(ii) Economic importance of insets & their control.

BOTANY

Plant Cell : Structure & functions electron microscopic structure mitochondria, Plastids centrosomes. Lysosomes, microsomes, endoplasmic reticulum, Nuclear, Golgibodes, D.N.A. & R.N.A. cytoplasm, membranes and cell wall.

Protoplasm : Structure, components physical and chemical properties.

Cell division (formation) - free cell formation, Amitosis & Meosis, Duplication of D.N.A.

Ecology : Ecological factors (atmospheric, edaphic, climatic, geological & biotic factors).

Ecosystem : Structure, components of ecosystem eg. Water soluble minerals and gases, producers consumers, decomposers, Pond and forest ecosystem.

Atmospheric pollution-causes and control, Types of pollution - Detergents, chemicals automobile exhaust, Radioactive matter, Smog, sound, Pesticides.

Genetics : Mendalism, Mendals experiment and law of inheritance.

Modern Classification of plant kingdom - (according to ostwald & Tippo) (outline).

Seeds in angiospermic plants : description of development of angiospermic plants (life history of angiospermic plants).

Fruits : Dispersal of fruits and seeds

Cell differentiation Plant Tissue : difference between dicot and Monocot stem. Secondary growth of stem and root. Anatomy of hydrophytes, Xeophytes & Mesophytes.

Important phylums :

Algae : Habitat, general characters & uses, description of ulothrix & spirogyra.

Bacteria : structure - types of nutrition, reproduction and economic importance.

Fungi : structure description of Rhizopus and yeast and their economic importance,

Fermentation.

Broyophyta : structure and economic importance, description of funaria (Moss)

Pteridophyta : general structures of pteridophytes description of fern (Droypteris)

General study of gymnosperms and life history of cycas.

Classification of angiospermn,

Description of families - identification and economic importance

Cruciferae, Malvaceae, Leguminosae, compositeae, cucurbitaceae.

Soil :

Absorption of water through root hairs osmosis, Translocation and Root pressure.

Nitrogen cycle.

Special modes of nutrition in plants (Autotrophic, heterotrophic, Parasites, saprophytes, Symbionts insectivorous and their ecological relation.

Photosynthesis : Chloroplast, light, chlorophyll and Carbon dioxide, Mechanism of photosynthesis formation of A.T.P. and their functions and importance of photosynthesis.

Transpiration : factors and importance, Mechanism of opening and closing of stomata.

Respiraton : aerobic, anaerobic respiration, mechanism of respiration (Glycolysis, Kreb's cycle, E.T.S.)

Growth & movement : definition of growth, Region of growth & their measurements, types of movements in plants, Growth hormone.

PAPER - 4 (APTITUDE TEST FOR GENERAL AWARENESS (BHMCT)

(A) Reasoning & Logical Deduction : Geometrical designs & Identification Selection of related

letters / words / numbers / figures Identification of odd thing / item out from a group

Completion of numerical series based on the pattern / logic

Fill in the blanks of the series based on the numerical pattern and logic of the series.

Syllogisms (logic based questions), Identification of logic & selection of correct answers based on the logic.

(B) Numerical Ability & Scientific Aptitude :

Arithmetical questions up to 10th standard Calculation of fraction, percentages, square roots etc. Profit & Loss and Interest calculations

Data / Table analysis, Graph & Bar Diagram and Pie Chart analysis Questions related to common use of science (Physics & Chemistry) Health & Nutrition

(C) General Knowledge :

Current affairs / Events (Political, Social, Cultural & Economic) Historical events

Geography including Tourist Places / Spots Current affairs relating to Business & Trade Countries & Currencies

Latest Who's Who?

Sports & Games

(D) English Language :

Word Meanings Antonyms & Synonyms Meaning of Phrases & Idioms Fill in the blanks

Complete / Improvement of the sentences with correct use of Pronouns, Verbs, Adverbs

& Adjectives
Reading comprehension's followed by questions

PAPER - 5 (APTITUDE TEST FOR MCA)

1. Mathematics

Modern Algebra : Idempotent law, identities, complementary laws, Demorgan's theorem, mapping, inverse relation, equivalence relation, Piano's Axiom, definition of rational numbers and integers through equivalence relation.

Algebra : Surds, solution of simultaneous and quadratic equations, arithmetic, geometric and harmonic progression, Binomial theorem for any index, logarithms, exponential and logarithmic series, determinants.

Probability : Definition, dependent and independent events, numerical problems on addition and multiplication of probability, theorems of probability.

Trigonometry : Simple identities, trigonometric equations, properties of triangles, use of mathematical tables, solution of triangles, height and distance, inverse functions, DeMoiver's theorem.

Co-Ordinate Geometry : Co-Ordinate geometry of the straight lines, pair of straight lines, circle, parabola, ellipse and hyperbola and their properties.

Calculus : Differentiation of function of functions, tangents and normal, simple example of maxima of minima, limits of functions, integration of function (by parts, by substitution and by partial fraction), definite integral (application to volumes and surfaces of frustums of sphere, cone and cylinder).

Vectors : Position vector, addition and subtraction of vectors, scalar and vector products and their applications.

Dynamics : Velocity, composition of velocity, relative velocity, acceleration, composition of acceleration, motion under gravity, projectiles, laws of motions, principles of conservation of momentum and energy, direct impact of smooth bodies, pulleys.

Statics : Composition of co-planar, concurrent and parallel forces, moments and couples, resultant of set of coplanar forces and conditions of equilibrium, determination of Centroides in simple case, problems involving friction.

(ii) Statistics : Theory of probability, Mean, Median, Mode, Dispersion and Standard Deviation.

(iii) Logical Ability : Questions to test analytical and reasoning capability of candidates.

PAPER- 6 (APTITUDE TEST FOR DIPLOMA HOLDERS IN ENGINEERING)

Engineering Mechanics, Engineering Graphics, Basic Electrical Engg., Basic Electronics Engg.,

Elements of computer science, Elementary Biology, Basic Workshop Practice and Physics/Chemistry/ Maths of Diploma standard.

PAPER-7 (APTITUDE TEST FOR DIPLOMA HOLDERS IN PHARMACY)

1. Pharmaceutics-I
2. Pharmaceutical Chemistry-I
3. Pharmacognosy
4. Biochemistry and Clinical Pathology
5. Human Anatomy and Physiology
7. Health Education & Community Pharmacy
7. Pharmaceutics-II
8. Pharmaceutical Chemistry-II
9. Pharmacology and Toxicology
10. Pharmaceutical Jurisprudence
11. Drug Store and Business management
12. Hospital and Clinical Pharmacy

PAPER- 8 (APTITUDE TEST FOR B.Sc. GRADUATE)

Linear Algebra : Matrix Algebra, Systems of linear equations, Eigen values and eigen vectors.

Calculus : Mean value theorems, Theorems of integral calculus, Evaluation of definite and improper integrals, Partial Derivations, Maxima and minima, Multiple integrals, Fourier series. Vector identities, Directional derivatives, Line, Surface and Volume integrals, Stokes, Gauss and Green's theorems.

Differential equations : First order equation (linear and nonlinear), Higher order linear differential equations with constant coefficients, Method of variation of parameters, Cauchy's and Euler's equations, Initial and boundary value problems, Linear partial differential equations with constant coefficients of 2nd order and their classifications and variable separable method.

Complex variables : Analytic functions, Cauchy's integral theorem and integral formula, Taylor's and Laurent's series, Residue theorem, solution integrals.

Probability and Statistics : Sampling theorems, Conditional probability, Mean, Median, mode and standard deviation, Random variables. Discrete and continuous distributions, Poisson, Normal and Binomial distribution, Correlation and regression analysis.

Fourier Series : Periodic functions, Trigonometric series, Fourier series of period 2p, Eulers formulae, Functions having arbitrary period, Change of interval, Even and odd functions, Half range sine and cosine series.

Transform Theory : Laplace transform, Laplace transform of derivatives and integrals, Inverse Laplace transform, Laplace transform of periodic functions, Convolution theorem, Application to solve simple linear and simultaneous differential equations.

Fourier integral, Fourier complex transform, Fourier sine and cosine transforms and applications to simple heat transfer equations.

Z-transform and its application to solve difference equations.

Paper – 9 MCA Lateral Entry (MCA Direct Second Year)

There shall be one paper of 90 minutes duration carrying 75 marks containing 75 multiple choice questions on mathematical Aptitude, Computer Science (BCA/B.Sc (CS)/B.Sc. (IT) Level and Logical Reasoning.

Mathematical Aptitude Test Areas: Logarithms, Surds, solution of simultaneous and qudratic equations, Inequalities, Matrices and Determinants, Progressions, Binomial Expansion,

Permutation and Combination, Function and Relation, 2-D Coordinate Geometry, Basics of Calculus, Basic Concepts of Probability.

Algebraic Structure : Group, Ring and Fields. Boolean Algebra and Prepositional Logic.

Computer Science : Representation of information & Basic Building Blocks of Computer System , Basic Operating System Concept, Algorithm development, Programming Language, Procedural and Object Oriented Programming, Basics of Data Structure with Array, Stack,

Queue,Tree, Fundamental of C++ and java Programming Languages.

Relational Data Model, SQL, Database Design & Normalization.
Fundamentals of Computer Network, Network Topology, TCP/IP and related protocols

Accounting : Principal of accounting, Basic financial concepts, capital budgeting, casting, ratio analysis.

Analytical and Logical Reasoning : Questions will be mainly for checking logical conclusion, graphical/data interpretation, etc.

Paper 10 - Aptitude Test for MBA (As per CAT Examination)

English or Verbal Ability: Reading comprehension, verbal reasoning, syllogisms, analogies, antonyms and synonyms, fill in the blanks, sentence correction, idioms, etc.

Maths or Quant Ability: Number systems, geometry, trigonometry, probability, permutation combination, algebra, mensuration, time and work, averages, percentages, profit and loss, quadratic and linear equations, etc.

Data Interpretation: Interpretation and analysis of data based on text, tables, graphs (line, area), charts (column, bar, pie), venn diagram, etc.

Logical Reasoning: Clocks, calendars, binary logic, seating arrangement, blood relations, logical sequence, assumption, premise, conclusion, linear and matrix arrangement, etc.

Paper 11 - Aptitude Test for M Pharm (As per GPAT Examination)

The important topics are as mentioned below -

- Physical Chemistry,
- Organic Chemistry,
- Pharmacology,
- Pharmacognosy,
- Biotechnology,
- Physical Pharmacy,
- Microbiology,
- Pharmaceutical Chemistry,
- Pharmaceutics,
- Pharmaceutical Analysis,
- Biochemistry,
- Anatomy, Physiology and Health Education,
- Pharmaceutical Engineering,
- Clinical Pharmacy and Therapeutics,
- Pharmaceutical Management,
- Pathophysiology,
- Biopharmaceutics and Pharmacokinetics,
- Pharmaceutical Jurisprudence,
- Dispensing & Hospital Pharmacy,

Paper 12 - Test for M tech - Aptitude, General Knowledge, Knowledge of Basic Mathematics & Computers and Common Engineering Subjects from B Tech)

English or Verbal Ability: Reading comprehension, verbal reasoning, syllogisms, analogies, antonyms and synonyms, fill in the blanks, sentence correction, idioms, etc.

Maths or Quant Ability: Number systems, geometry, trigonometry, probability, permutation combination, algebra, mensuration, time and work, averages, percentages, profit and loss, quadratic and linear equations, etc.

Data Interpretation: Interpretation and analysis of data based on text, tables, graphs (line, area), charts (column, bar, pie), venn diagram, etc.

Logical Reasoning: Clocks, calendars, binary logic, seating arrangement, blood relations, logical sequence, assumption, premise, conclusion, linear and matrix arrangement, etc.

Fundamental of Computer Science

Basic Electrical Engineering

Basic Electronics Engineering

Basic Mechanical Engineering

Engineering Drawing