Syllabus of Online Entrance Examination - 2014

1. **50 QUESTIONS** of General Awareness.
2. **50 Questions** subject based as per the syllabus given below.

The above pattern will not be applicable to the courses of M.Phil Statistics, Biostatistics and M.Sc. Nuclear Medicine.

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<th>Programmes</th>
<th>Syllabus</th>
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<tr>
<td>1. M.Phil. Statistics</td>
<td><strong>Probability and Distribution theory</strong></td>
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<td></td>
<td>Brief review of basic distribution theory, joint, marginal, conditional pmf’s and pdf’s, standard discrete and continuous distributions, bivariate normal, bivariate exponential and multinomial distributions, functions of random variables and transformation of random variables. Compound, truncated and mixture distributions, conditional expectation, multiple and partial correlations, linear and multiple regressions. Markov, Holder, Jensen, Liapunov inequalities. Sampling distributions, non-central Chi-square, t and F distributions and their properties. Distributions of quadratic forms under normality and related distribution theory. Order statistics, their distributions and properties, joint and marginal distributions of order statistics, distribution of median and range, extreme values.</td>
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**Statistical Inference**

Locally best test, UMPU tests, Similar tests, Neyman structure, UMPU tests against one-sided and two-sided alternatives, Confidence set estimation, Relation with hypothesis testing, optimum parametric confidence sets.

**DESIGN OF EXPERIMENTS**

Principles of design of experiments, uniformity trials, randomized experiments, completely randomized design, randomized block design. Latin square design.

Analysis of covariance in a general Gauss-Markov model, applications to standard designs.

Fixed, mixed and random effects models; Variance components estimation - study of various methods; Tests for variance components; Missing plot technique - general theory and applications.

General factorial experiments, factorial effects; best estimates and testing the significance of factorial effects; study of 2 and 3 factorial experiments in randomized blocks; Complete and partial confounding. Fractional replication for symmetric factorials. Split plot and split block experiments.

**SAMPLEING TECHNIQUES**


Horvitz-Thompson estimator, its variance and unbiased estimator of variance, IPPS schemes of sampling due to Midzuno-Sen, Rao-Hartley-Cochran and Samphord.

The Jackknife and Bootstrap: estimate of bias, estimate of variance. Ratio Estimation in reference to Jackknife and bootstraps, Relationship between the jackknife and the bootstrap. Interpenetrating sub sampling.

**Multivariate Analysis**


Null distribution of Hotelling's $T^2$ statistic, Application in tests on mean vector for one and more multivariate normal populations and also on equality of the components of a mean vector in a multivariate normal population, Fisher Behren Problem.
Classification and discrimination procedures for discrimination between two multivariate normal populations - sample discriminant function, test associated with discriminant functions, probabilities of misclassification and their estimation, classification into more than two multivariate normal populations.

Multivariate Analysis of variance (MANOVA) for one way classified data only, Principal components, dimension reduction, Canonical variables and canonical correlations: definition, use, estimation and computation.

Non-Parametric Inference
Non-Parametric Inference: Test for Randomness, Test based on Runs & Sign for one & two samples problems, Median test, Wilcoxon and Mann-Whitney tests. Kolmogorov-Smirnov test for one and two samples.

Operation Research
Introduction: Definition and scope of operations research, Different types of models used in OR. Various phases of OR.
Construction of dual of a L.P.P.
Assignment Problems: Assignment problems, formulation of these problems and their solutions, Unbalanced Assignment problems.

2. M.Phil. Management
As per the syllabus of UGC NET.

3. M.Phil. Economics
As per the syllabus of UGC NET.

4. M.Tech. (Computer Science)

Part I:
Computer Organization and Architecture: Machine instructions and addressing modes, ALU and data-path, CPU control design, Memory interface, I/O interface (Interrupt and DMA mode), Instruction pipelining, Cache and main memory, Secondary storage.
Discrete Mathematics: Counting principles, linear recurrence, mathematical induction, equation sets, relations and function, predicate and propositional logic. Digital Logic: Logic functions, Minimization, Design and synthesis of combinational and sequential circuits; Number system representation and computer arithmetic.
Part II: -
Programming and Data Structures: Programming in C; Functions, Recursion, Parameter passing, Scope, Binding; Abstract data types, Arrays, Stacks, Queues, Linked Lists, Trees, Binary search trees, Binary heaps.
Analysis and Design of Algorithms: Analysis, Asymptotic notation, Notions of space and time complexity, Worst and average case analysis; Design: Greedy approach, Dynamic programming, Divide-and-conquer; Tree and graph traversals, Connected components, Spanning trees, Shortest paths; Hashing, Sorting, Searching. Asymptotic analysis (best, worst, average cases) of time and space, upper and lower bounds, Basic concepts of complexity classes P, NP, NP-hard, NP-complete.

Part III: -
Computer Networks and Operating System: Error-Detection and Error-correction techniques, Topology, Routing and Internetworking, Channel Allocation, Congestion Control, Processes, Threads, Concurrency, Synchronization, Deadlock, CPU scheduling, Memory management and virtual memory, File systems.
Databases: ER-model, Relational model (relational algebra, tuple calculus), database design (integrity constraints, normal forms), File structures Transactions and concurrency control.
Information Systems and Software Engineering: information gathering, requirement and feasibility analysis, data flow diagrams, process specifications, input/output design, process life cycle, planning and managing the project, design, coding, testing, implementation, maintenance.

<p>| 8.  | Master of Social Work (MSW) | <strong>Basic Concepts:</strong> Society; Community; Association; Social Groups; Culture - Social Work; Social Welfare; Social Service; Social Reform; Social Security; Social Justice; Social Defence; Social Policy; Social Planning; Social Development. <strong>Social Institutions:</strong> Marriage and Family, Religion and Caste. <strong>Social Problems:</strong> Poverty; Illiteracy; Un-employment; Beggary; Crime; Gender Discrimination; Children-in-Conflict with Law; Children-in-Need of Care and Protection; Alcoholism; Drug Dependence; Commercial Sex Work; Child Labour; Human Trafficking; Corruption; Communal Tensions; Indian Labour Problems. <strong>Development:</strong> Social and Economic Indicators. National and International Organisations involved in Social Welfare – Role of Voluntary Action in Social Development. <strong>Issues Concerned with Children:</strong> Youth; Women and Aged – Social Legislation pertaining to Women; Children; and Persons with Disabilities. |</p>
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<tr>
<td><strong>11.</strong> MA/MSc in Fashion Technology &amp; Apparel Design</td>
<td>Syllabus will contain graduate level knowledge of B.A./B.Sc. in area of Food Science, Home Science, Textile, Fashion Technology.</td>
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<td><strong>12.</strong> MA- Psychology</td>
<td>Graduate course of Arts, Commerce &amp; Science with any discipline.</td>
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<tr>
<td><strong>13.</strong> MA- Philosophy</td>
<td>Graduate course of Arts, Commerce &amp; Science with any discipline.</td>
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<tr>
<td><strong>14.</strong> MA/M.Sc. Anthropology</td>
<td>Concept of organization of society; Forms of social organization; family, lineage, clan, moiety, Phratry, Tribe. Definition and significance; order within and between societies; Concept of authority, power, rank, leadership, legitimacy and control.</td>
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<td>15.</td>
<td>MA- Public Health</td>
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| 16. | MA-Public administration | General Knowledge – 50%  
Indian Political System and Administration – 50% |
| 17. | MA- Community Development | Community Development concept, Definition, meaning, need, history, principles, objectives and scope. Rural development concept, definition, meaning, need, objects and scope.  
Rural Development in India – Origin and background – early experiments like Srinekethan, Sevagram, Marthandam, Gurugen experiment, Baroda experiment, Firka development in Madras. Nilokheri experiment, Etowah pilot project etc.  
Approaches to rural development – Gandhian contractive program – contribution of Vinobaji.  
Agrarian relations and movements in India with special reference to Bhoodan and Gramdhan. Role of NGOs, Industries in rural development.  
Slums in India: Theories, causes and conditions, poverty in urban areas, culture of poverty in slums, poverty alleviation programmes.  
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<th>18.</th>
<th>MA- Disaster Management</th>
<th>Concepts, Approaches and theories of disasters, Relief, rehabilitation and reconstruction, Role of national and international agencies in disaster management, Natural and human induced disasters, Finance and insurance in Disaster Management.</th>
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<td>MA-Hindi</td>
<td>मान्यता प्राप्त विद्याद्धालय से किसी भी विषय में स्नातक स्तर का ज्ञान।</td>
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<td></td>
<td>MA-Development Studies</td>
<td>Syllabus will cover subject areas of social science, Indian history particularly modern Indian history and freedom struggle, Indian Polity, Indian Economy, Basic concept on society and its structure. Indian Geography (Demography, Census, Environment etc.)</td>
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|  | MA-Education | Syllabus is divided into two parts-  
1. General Knowledge and Current affairs. All the disciplines upto class 10th.  
2. General awareness relating to teaching aptitude, reasoning, numerical ability, language proficiency and awareness relating to educational planning, policy, provisions, schemes, committees & commissions. |
|  | BPEd (4 Year Integrated Physical Education Course)/ 8 Sem. | 10+2 level knowledge from any stream (Arts/ Science/Commerce). |

**Master of Science (M.Sc.) Programmes (4 Semester)**

|   | MSc - Basic Science [5 Yrs Integrated course] (On the pattern of IISER) | **GENERAL** :  
There is no specific syllabus for the General section. This section aims to test the candidate’s general ability to comprehend qualitative and quantitative aspects of a given scientific passage and interpretation of graphs of simple systems. This will be done by giving a passage on some scientific topic and questions based on the concepts elaborated in the passage will be asked. Questions are designed to test the candidate’s familiarity with (and not a detailed understanding of) major historical milestones in mathematics, physics, chemistry, biology, astronomy, computer science and environment. There will be some questions designed to test the grasp of mathematics up to 10th standard and application capabilities of the same to simple problems.  

**Biology** :  
Cell Biology-  

Anatomy and Physiology-  


Immunology - Basics of immune mechanisms and diseases - active and passive immunity, T and B cell responses, antigen presentation, principles of vaccination, monoclonal antibodies and their uses, immunology of AIDS. Enzymes - catalysis, kinetics, activation energy, competitive and non-competitive inhibition.

Ecology -

Botany -

Humans and Environment -
Soil, rainfall and temperature with reference to natural resources. Our natural resources - their uses and abuses.
Environmental pollution and preventive measures.

**CHEMISTRY:**

**Physical Chemistry**


Solid state - Classification of solids. Crystalline state, seven crystal systems (cell parameters a, b, c, alpha, beta, gamma), close packed structure of solids (cubic), packing in fcc, bcc and hcp lattices. Nearest neighbours, ionic radii. Simple ionic compounds, point defects. Solutions - Raoult's law. Molecular weight determination from lowering of vapour pressure, elevation of boiling point and depression of freezing point.

Inorganic Chemistry-
Study of different groups in periodic table –
Group 1A (Preparation, properties and reactions of alkali metals, with emphasis on chemistry of Na and K and their compounds - oxides, peroxides, hydroxides, carbonates, bicarbonates, chlorides and sulphates)
Group 2A (preparation, properties and reactions alkaline earth metals with emphasis on Mg and Ca and their compounds such as oxides, peroxides, hydroxides, carbonates, bicarbonates, chlorides and sulphates)
Group 3A (chemistry of Boron and its compounds – diborane)
Group 8A (preparation, properties and reactions inert gases with emphasis on chemistry of Xenon)
Group 7A (halogen chemistry with special emphasis on chemistry of chlorine)
Study of nonmetals - C, S, N, P (especially oxides and oxyacids compounds of these elements, in addition phosphines for P, ammonia for N) and O (peroxide and ozone), Si (silicones and silicates). (Allotropes of C, S, N should be covered.)
Transition elements (3d series) - Definition, general characteristics, variable oxidation states and their stabilities, colour (excluding the details of electronic transitions) and calculation of spin-only magnetic moment. Coordination compounds - nomenclature of mononuclear coordination compounds. cis-trans and ionisation isomerisms, hybridization and geometries of mononuclear coordination compounds (linear, tetrahedral, square planar and octahedral).
Metals and metallurgy - General methods involving chemical principles. General operation stages involved in metallurgical operation. Metallurgy of p-block element (emphasis on Al). Metallurgy of Fe-triad (Fe, Co, And Ni with more emphasis on Fe metallurgy). Metallurgy of coinage metals (Cu, Ag with more emphasis on Cu)

Organic Chemistry-

Characteristic reactions of the following (including those mentioned above)


**MATHEMATICS:**

**Algebra**
Algebra of complex numbers, addition, multiplication, conjugation, polar representation, properties of modulus and principal argument, triangle inequality, cube roots of unity, geometric interpretations. Quadratic equations with real coefficients, relations between roots and coefficients, formation of quadratic equations with given roots, symmetric functions of roots. Arithmetic, geometric and harmonic progressions, arithmetic, geometric and harmonic means, sums of finite arithmetic and geometric progressions, infinite geometric series, sums of squares and cubes of the first n natural numbers. Logarithms and their properties. Permutations and combinations, Binomial theorem for positive integral index, properties of binomial
coefficients. Matrices as a rectangular array of real numbers, equality of matrices, addition, multiplication by a scalar and product of matrices, transpose of a matrix, determinant of a square matrix of order up to three, inverse of a square matrix of order up to three, properties of these matrix operations, diagonal, symmetric and skew-symmetric matrices and their properties, solutions of simultaneous linear equations in two or three variables.

Addition and multiplication rules of probability, conditional probability, Bayes Theorem, independence of events, computation of probability of events using permutations and combinations.

**Trigonometry**

Trigonometric functions, their periodicity and graphs, addition and subtraction formulae, formulae involving multiple and sub-multiple angles, general solution of trigonometric equations.

Relations between sides and angles of a triangle, sine rule, cosine rule, half-angle formula and the area of a triangle, inverse trigonometric functions (principal value only).

**Analytical geometry**

Two dimensions - Cartesian coordinates, distance between two points, section formulae, shift of origin.

Equation of a straight line in various forms, angle between two lines, distance of a point from a line. Lines through the point of intersection of two given lines, equation of the bisector of the angle between two lines, concurrency of lines. Centroid, orthocentre, incentre and circumcentre of a triangle.

Equation of a circle in various forms, equations of tangent, normal and chord. Parametric equations of a circle, intersection of a circle with a straight line or a circle, equation of a circle through the points of intersection of two circles and those of a circle and a straight line.

Equations of a parabola, ellipse and hyperbola in standard form, their foci, directories and eccentricity, parametric equations, equations of tangent and normal. Locus Problems.

Three dimensions - Direction cosines and direction ratios, equation of a straight line in space, equation of a plane, distance of a point from a plane.

**Differential calculus**

Real valued functions of a real variable, into, onto and one-to-one functions, sum, difference, product and quotient of two functions, composite functions, absolute value, polynomial, rational, trigonometric, exponential and logarithmic functions.

Limit and continuity of a function, limit and continuity of the sum, difference, product and quotient of two functions, L'Hospital rule for evaluation of limits of functions.

Even and odd functions, inverse of a function, continuity of composite functions, intermediate value property of continuous functions. Derivative of a function, derivative of the sum, difference, product and quotient of two functions, chain rule, derivatives of polynomial, rational, trigonometric, inverse trigonometric, exponential and logarithmic functions.

Derivatives of implicit functions, derivatives up to order two, geometrical interpretation of the derivative,
tangents and normals, increasing and decreasing functions, maximum and minimum values of a function, Rolle’s Theorem and Lagrange’s Mean Value Theorem.

**Integral calculus**
Integration as the inverse process of differentiation, indefinite integrals of standard functions, definite integrals and their properties, Fundamental Theorem of Integral Calculus. Integration by parts, integration by the methods of substitution and partial fractions, application of definite integrals to the determination of areas involving simple curves. Formation of ordinary differential equations, solution of homogeneous differential equations, separation of variables method, linear first order differential equations.

**Vectors**
Addition of vectors, scalar multiplication, dot and cross products, scalar triple products and their geometrical interpretations.

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**PHYSICS:**

**General**
Units and dimensions, dimensional analysis. Least count, significant figures. Methods of measurement (Direct, Indirect, Null) and measurement of length, time, mass, temperature, potential difference, current and resistance. Design of some simple experiments. Identification of independent, dependent and control variables. Identification of sample size, range and interval. Identification of appropriate measurement techniques and instruments. Graphical representation, interpretation and analysis of data. Errors in the measurements and error analysis.

**Mechanics**


Rigid body, moment of inertia, parallel and perpendicular axes theorems, moment of inertia of uniform bodies with simple geometrical shapes. Angular momentum, Torque. Conservation of angular momentum. Dynamics of rigid bodies with fixed axis of rotation. Rolling without slipping of rings, cylinders and spheres. Equilibrium of rigid bodies. Collision of point masses with rigid bodies.

Linear and angular simple harmonic motions. Hooke’s law, Young’s modulus.


Plane wave motion, longitudinal and transverse waves, superposition of waves. Progressive and stationary

**Thermal physics-**

**Electricity and magnetism-**

**Optics-**

**Modern physics-**
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<th><strong>M.Sc. Biostatistics</strong></th>
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<tr>
<td><strong>Descriptive Statistics</strong></td>
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<td><strong>Probability Theory and Distributions</strong></td>
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<tr>
<td>Random experiment, trial, sample point and sample space, events, operations of events, concepts of equally likely, mutually exclusive and exhaustive events. Definition of probability: Classical, relative frequency and axiomatic approaches. Discrete probability space, properties of probability under set theoretic approach Independence of events, Conditional probability, total and compound probability theorems, Bayes theorem and its applications.</td>
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<tr>
<td>Random variables – discrete and continuous, probability mass function (pmf) and probability density function (pdf), Cumulative distribution function (cdf) and their properties. Joint pmf / pdf of several random variables. Marginal and conditional distributions of functions of discrete and continuous random variables,. Independence of random variables, Expectation of a random variable and its properties, Moment Generating Function (m.g.f) and Characteristic Function.</td>
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<tr>
<td>Review of Standard univariate and bivariate- discrete and continuous distributions: degenerate, discrete uniform, binomial, Poisson, geometric and negative binomial, hyper-geometric, continuous uniform, normal distributions, exponential distributions, reproductive property of standard distributions.</td>
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<tr>
<td>Chebyshev’s inequality. Weak law of large numbers and Central Limit Theorem for a sequence of independently and identically distributed random variables and their applications. Law of large numbers and central theorem. Review of Sampling Distributions, ( z ), ( t ) and ( F ) distributions.</td>
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Elements of Demography
Introduction to Demography: Source of Demography Data: Census, vital events, registration, survey, extent of under registration, Chandrasekhar Deming Index Mortality, Measurements: Crude and specific rates, direct and indirect methods of standardization, Determinants of mortality
Fertility: Crude and specific rates, gross reproduction rates, net reproduction rates, parity progression ratio, child-women ratio. Determinants of fertility, fertility differentials.
Life table - construction and uses, Abridged Life table-construction and uses, Concept of model life table.

Sampling Theory
Concepts of population and sample, advantages of sampling, census and sample surveys, Basic concepts in sampling and designing of a large scale surveys. Types of sample - the convenience sample, Judgment sample and the probability sample; simple random sampling with and without replacement.
Systematic sampling, Stratified sampling, Estimation of mean, Proportion and standard error using the above probability sampling, probability proportional to size sampling, Estimation of sample size for clinical experiments, sources of error in surveys.

Inference
Parametric models, parameters, problem of inference, Estimation: properties of point estimations, Minimum variance unbiased estimator, best linear unbiased estimator, interval estimation: Confidence interval for mean, variance of normal distribution, proportions, Correlation and regression coefficients. Confidence interval of mean and variable for small samples.
Testing Hypothesis: Critical region and level o significance, test of a simple hypothesis against simple alternative, composite hypothesis, Neyman-Pearson test of hypothesis, UMP test, UMP unbiased test, Likelihood ratio test, Test on the mean of normal population, difference between the mean of two normal population, Test on the variance of normal populations, .2 -test, .2 - goodness of fit test and test of independence in contingency tables. Test of proportion, test of correlation and regression coefficient, Test based on .2 , t and F.

Designs of Experiment
Need for designing of experiments, Fundamental principles of design of experiments. Basic designs-CRD, RBD and LSD. Their layout and analyses. Orthogonality of classification in two-way lay-outs, advantages of orthogonality relation, simple illustrations.
Fixed, mixed and random effect models; Variance components estimation – study of various methods; Analysis of co-variance, missing plot techniques -general theory and application, Cross-over design.
Factorial experiments: 2n, 32 factorial experiments, illustrations, main effects and interactions,
| 27 | MSc-Life Science | Knowledge of Life Science / Zoology / Botany / Biotechnology / Agriculture Biotechnology in general. |
| 28 | M.Sc. Climate Change and Biodiversity Conservation | Requires knowledge of Life science, Biology in general with special emphasis on Zoology. |
| 29 | M.Sc. Post Harvest Technology and Management | Candidate should have Graduation level knowledge in area of Agriculture Science, Biology, and Forestry. |
| 31 | M.Sc. Regenerative Biology and Tissue Engineering | Graduate level (10+2+3) knowledge of Life Science, Biotechnology, Biochemistry. |
| 32 | M.Sc. System Biology and Bioinformatics | Graduate level (10+2+3) knowledge of Biophysics, Bioinformatics, Biotechnology, Biochemistry or B.Sc. with Biology. |
| 33 | M.Sc. Nano-science and Nanotechnology | Graduate level knowledge of Chemistry, Physics, Zoology Botany, Basic Biochemistry and Molecular Biology, Basic Concepts of Drugs, Antibiotic, Basic Agriculture with emphasis on fertilizers, Soil Science/Agricultural Chemistry, Basic Microbiology& Instrumentation. |
| 35 | M.Sc. Nuclear Medicine | **General scientific awareness and scientific aptitude (50 questions)**  
Atom, nucleus, atomic model, valency, periodic table, states of matter, boiling point, evaporation, freezing, materials, ores, alloy, chemical reactions, acid, base.  
Biodiversity, evolution of life on earth, food chains, vitamins, water cycle, human body, hormones.  
Dimension and units, Newton’s laws of motion, gravitation, current scientific and technological events and of such matters of everyday observation and experience, light and related events.  
Reasoning on number system, mean, mode, median, relationship concepts, fundamental arithmetical operations, percentage, ratio and proportion, averages, interest, profit and loss, graphs, time and distance.  
Origin of the earth, universe and our galaxy, constitution of atmosphere, planet, satellite, Indian satellite program, ocean, solar energy, environmental problems of India and world, pollution and its kind.  
Knowledge about various scientific organizations and funding agencies.  
**Physics (10 questions)**  
Radioactivity, Isotopes and nuclides, binding forces between nuclear particles, alpha and beta particles, gamma
radiation, mechanisms of radioactive decay, fission and fusion, half life, interaction of electrons, X-rays and \(\gamma\)-rays with matter, radiation detectors, electric field, Gauss and Coulomb’s law, Magnet field, Amperes’s law, Biot-Savert law, Faraday law, Lenz’s law, electromagnetic wave and its properties, electromagnetic spectrum, semiconductor – p-type and n-type materials, pn junction, diodes, transistors, FET, biasing of diode and transistor, wave particle duality, de-Broglie wave length, Heisenberg’s uncertainty principle.

**Chemistry (10 questions)**

**Inorganic Chemistry:** Atomic and molecular structure, periodic properties, chemical bonding, oxidation and reduction, acid and bases (HSAB principle), chemistry of transition elements, lanthanides, actinides, symmetry and symmetry elements, bio-inorganic chemistry, electronic spectra.

**Organic Chemistry:** Structure and bonding, reaction mechanism, stereochemistry, UV, IR, mass, NMR spectroscopy, synthetic reagents, study of alkenes, alkynes, dienes, arenes and various functional groups, synthetic polymers, dyes, carbohydrates and proteins.

**Physical Chemistry:** Quantum mechanics, thermodynamics, chemical equilibrium, chemical kinetics and catalysis, electrochemistry, rotational, vibrational and electronic spectrum, gaseous, liquid, solid and colloidal state.

**Mathematics (10 questions)**

**Calculus:** Differentiation, Integration, Maxima- Minima, Tangents and Normal, Area and Volumes of finite curve, System of linear system equation, Binomial Theorem, Permutation & Combination, Elements of Probability, Binomial, Poisson and Normal Distribution, Sequence and series and their convergence, Matrix and Linear algebra: Elementary matrix operations, eigen values and eigen vectors, trace of matrices and related properties of matrices, Vector space, subspace, span, rank- nullity theorem.

**Biology (10 questions)**

**Cell biology:** Prokaryotic and eukaryotic cell-structure and organelle functions. Functions of sub-organells of cell i.e., Nucleus, Endoplasmic reticulum, Golgi apparatus, Peroxisomes and mitochondria. Structure of Cell membrane types and regulation of transport.

**Metabolism:** Carbohydrate, Lipids, amino acids and nucleotides turn over and its regulation, Metabolic disorders. Glycolysis, TCA cycle, Urea cycle, Gluconeogenesis, Glyoxalate cycle and pentose phosphate pathway. ATP synthesis-oxidative and photo-phosphorylation.

**Molecular Biology:** Prokaryotic and eukaryotic Replication, Transcription Translation, mechanism and their regulation. DNA Repair systems. Recombination. Concept of Recombinant DNA Technology: Cloning vectors: Plasmids, Bacteriophages, Cosmids, phagemids, YACs, Restriction enzymes, Ligases, PCR.

**Bio-Techniques:** Principles, types and applications of Chromatography, Centrifugation, Electrophoresis, Spectrophotometry and Blotting techniques.

**Animal & Plant physiology:** Physiology and development of circulatory, nervous system. Endocrine and exocrine system: hormone diversity and action. Transport across plant cell, Transpiration, Photosystems, Flowering, plant hormones. Plant tissue culture and production of transgenic plants, Enzymes

**Computer Science (10 questions)**

History of Computers, Functioning of Computer Systems, Components of Computer System, I/O Storage
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<tr>
<th>Score</th>
<th>Course Title</th>
<th>Description</th>
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<tr>
<td>36</td>
<td><strong>M.Sc. Medical Biotechnology</strong></td>
<td>Basic knowledge of the following subject at graduation level: Chemistry, Botany, Zoology along with allied subjects like Biotechnology, Biochemistry, Microbiology with special emphasis in Molecular Biology, recombinant DNA technology, Immunology and Biophysical techniques. The knowledge in Physics and Computers at 10+2 level.</td>
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<td>37</td>
<td><strong>Master of Visual Arts (M.V.A.) Programmes (4 semesters)</strong></td>
<td>Candidates having B.V.A./B.F.A. four years degree courses with 50% marks (45% for SC/ST/PH) of the recognized University / Institute.</td>
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<td>38</td>
<td><strong>Painting, Sculpture and Classical Arts</strong></td>
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<tr>
<td>39</td>
<td><strong>Master of Performing Arts (M.P.A.) Programmes (4 semesters)</strong></td>
<td>The applicant must have a Graduate degree with 50% marks (45% marks for SC/ST/PH) in B.A. / B.A. (Honours) with music or B. Dance / B.P.A. or Graduation from a recognized university with one of the following; a) ‘Sangeet Praveen’ from Prayag sangit samiti, Allahabad; b) ‘Parangat’ from Bhatkhande Music Institute, Deemed University, Lucknow; c) ‘Sangeet Nipun’ from Bhatkande Sangeet Vidhya Peeth, Lucknow; d) Kovid from Indira Kala Sangeet University.</td>
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