ANNEXURE-II

Scheme of examination for the post of Degree College Lecturers in Residential Educational Institutions Societies as per G.O.Ms.No.31, SCD (RS) Dept, dated: 08.06.2018

Scheme of Examination

Written Examination (Objective Type)		**No. of Questions**	**Duration (Minutes)**	**Marks**
Paper-I	General Studies, General Abilities and Basic Proficiency in English	100	120	100
Paper-II	1. For Lecturers, Subject Discipline Knowledge/ Concerned Subject (P.G.Level). 2. For Physical Directors, Physical Education (P.G.Level). 3. For Librarians, Library and Information Science (P.G.Level).	100	120	100
Demonstration				25
			Total	**225**

Written Examination Syllabus for the post of Degree College Lecturers in Residential Educational Institutions Societies

Paper - I

Section-I: General Studies

1. Current Affairs – Regional, National & International.
2. Indian Constitution; Indian Political System; Governance and Public Policy.
3. Social Exclusion; Rights issues such as Gender, Caste, Tribe, Disability etc. and inclusive policies.
4. Society Culture, Civilization Heritage, Arts and Literature of India and Telangana
5. General Science; India's Achievements in Science and Technology
6. Environmental Issues; Disaster Management- Prevention and Mitigation Strategies and Sustainable Development.
7. Economic and Social Development of India and Telangana.
8. Socio-economic, Political and Cultural History of Telangana with special emphasis on Telangana Statehood Movement and formation of Telangana state.

Section-II: General Abilities

9. Analytical Abilities: Logical Reasoning and Data Interpretation.
10. Moral Values and Professional Ethics in Education.
11. Teaching Aptitude

Section – III: Basic Proficiency in English

i) School Level English Grammar:
Articles; Tense; Noun & Pronouns; Adjectives; Adverbs; Verbs; Modals; Subject-Verb Agreement; Non-Finites; Reported Speech; Degrees of Comparison; Active and Passive Voice; Prepositions; Conjunctions; Conditionals.

ii) Vocabulary:
Synonyms and Antonyms; Phrasal Verbs; Related Pair of Words; Idioms and Phrases; Proverbs.

iii) Words and Sentences:
Use of Words; Choosing Appropriate words and Words often Confused; Sentence Arrangement, Completion, Fillers and Improvement; Transformation of Sentences; Comprehension; Punctuation; Spelling Test; Spotting of Errors.

Written Examination Syllabus for the post of Degree College Lecturers in Residential Educational Institutions Societies

1. Paper – II: Telugu

(ఎ) సంప్రదాయ సాహిత్యకవుల అధ్యయనం – కాలం – రచనలు

నన్నయ, తిక్కన, ఎర్రన, శివకవులు (నన్నెచోడుడు, మల్లికార్జున పండితారాధ్యుడు, పాల్కురికి సోమనాథుడు), నాచనసోమన – భాస్కర రామాయణ కావులు, రంగనాథ రామాయణ కవి – శ్రీనాథుడు – పోతన – పిల్లలమర్రి పినవీరభద్రుడు – గౌరన – అనంతామాత్యుడు – కొరవి గోపరాజు – నంది మల్లన, ఘంట సింగన – అష్టదిగ్గజ కవులు – తాళ్ళపాక కవులు – పొన్నగంటి తెలగన్న – చేమకూర వెంకటకవి – తంజావూరు రాజకవులు కవయిత్రులు – కందుకూరి రుద్రకవి, మడికి సింగన

(బి) వేమన తాత్త్వికత – సమకాలిక పరిశీలన, దృక్పథం – సమాజంపై వేమన కవిత్వ ప్రభావం.

సాహిత్య ధోరణుల అధ్యయనం – యుగప్రభావం – రూపాలు – మొదలైనవి. ఇతిహాసం – పురాణం ప్రబంధం – శతకం– సంకీర్తన సాహిత్యం – చారిత్రక కావ్యం – సంప్రదాయ, ఆధునిక గద్య రచనలు – నవల – కథానిక – వ్యాసం –ఏకాంకిక మొదలైనవి – వాదాలు (దళిత, హేతు, స్త్రీ, మైనారిటి , బి.సి. ప్రాంతీయ)

జానపద విజ్ఞానం – గేయాలు – కతాగేయాలు – గద్యాఖ్యానాలు – (పురాణగాథలు – ఐతిహ్యాలు – కథలు), సామెతలు – పొడుపుకథలు – జానపద కళలు – (వీధి నాటకాలు, యక్షగానాలు, బొమ్మలాటలు,, పగటి వేషాలు, చిందు, ఒగ్గు, జాతర కళారూపాలు.

ఆధునిక కవులు అధ్యయనం – ఆధునిక ధోరణులు వారి రచనలు – గురజాడ – రాయప్రోలు – విరెశలింగం – విశ్వనాథ – దేవులపల్లి – బసవరాజు – పింగళి – కాటూరి – దువ్వూరి – పుట్టపర్తి – శ్రీశ్రీ – కాళోజి, దాశరథి, సి. నారాయణ రెడ్డి , ఎన్. గోపి – ప్రసిద్ధ ఆధునిక కవులు – భావ, అభ్యుదయ, విప్లవ, – దిగంబర, చేతనావర్తన కవులు.

తెలుగు వ్యాకరణ, ఛందస్సు అధ్యయనం:

వ్యాకరణం – బాల వ్యాకరణం (సంజ్ఞ, సంధి, క్రియా, తత్సమ, ఆచ్చిక ప్రకరణాలు ఛందస్సు – వృత్తాలు, జాతులు, ఉపజాతులు (ఉత్పలమాల, చంపకమాల, శార్దూలం, మత్తేభం, ద్విపద, తరువోజ , సీసం, కందం, స్రగ్ధర , పంచచామరం) అలంకారాలు – అర్థాలంకారాలు, శబ్దాలంకారాలు తెలుగు భాషా చరిత్ర పరిణామం – (ప్రాఙ్నన్నయ యుగం నుండి నేటి వరకు) – ద్రావిడ భాషా కుటుంబాలలో తెలుగు స్థానం – భౌగోళిక విభజన – మాండలికాలు.

భాషా విజ్ఞాన అధ్యయనం – భాషా శాస్త్రం, అర్థ విపరిణామం – ఆధునిక కాలం,: శాసన భాష నుండి సాహిత్య భాష వరకు (వ్యావహారిక భాష ఉద్యమం వంటివి

తెలుగు సాహిత్య పరిణామం (ప్రాఙ్నన్నయ యుగం నుండి నేటి వరకు) సౌందర్య, సాహిత్య విమర్శ అధ్యయనం (ఫ్రాక్, పశ్చిమ) ఆధునిక తెలుగు సాహిత్య విమర్శ. సంస్కృత వ్యాకరణం – కావ్యాలు – సంస్కృత వ్యాకరణం ప్రాథమిక విజ్ఞానం, సామాన్య ప్రామాణిక గద్య, పద్య పాఠ్యాంశాలు – హితోపదేశం, కాళిదాసుని కృతులు, సంస్కృత పంచకావ్యాల పరిచయం.

Written Examination Syllabus for the post of Degree College Lecturers in Residential Educational Institutions Societies

2. Paper – II: English

I. Genres, Movements, Schools, Concepts:

- Renaissance-Reformation, Metaphysical poetry, Neo-classicism, Puritanism, Restoration, Romanticism,Victorian Age, Realism-Naturalism, Expressionism, Symbolism, Modernism, Postmodernism.
- Structuralism, Poststructuralism, Feminism, Postcolonialism, Diaspora, Race Gender and Caste.
- English Literary Criticism from Philip Sydney to Matthew Arnold
- New Criticism, Formalism, Archetypal criticism, New Historicism, Psychoanalytical criticism, Reader response criticism.
- Literary Genres: Poetry, Fiction, Prose, Drama (origins and development, elements, forms, types)

II. Writers and Texts:

• Christopher Marlowe	Doctor Faustus
• William Shakespeare	Hamlet
• John Milton	Paradise Lost-Book 1
• William Wordsworth	"Immortality Ode", Tintern Abbey
• Robert Browning	"My Last Duchess", "Andrea del Sarto"
• Thomas Hardy	Tess of the d' Urbervilles
• TS Eliot	The Waste Land
• G.B. Shaw	Saint Joan
• Virginia Woolf	"A Room of One's Own"
• William Golding	Lord of the Flies
• Walt Whitman	"When Lilacs Last in the Dooryard Bloomd","Crossing Brooklyn Ferry"
• Arthur Miller	Death of a Salesman
• Toni Morrison	Beloved
• Mulk Raj Anand	Untouchable
• Kamala Das	"An Introduction", "The Old Playhouse"
• Girish Karnad	Hayavadana
• Salman Rushdie	Midnight's Children
• Chinua Achebe	Things Fall Apart
• Margaret Atwood	Edible Woman
• Derek Walcott	Dream on Monkey Mountain

III. English Language Teaching:

1. ELT in India: (History and status of English in India; English as Second Language, English asForeign Language, and English as Global Language).
2. Methods and Approaches: (Grammar Translation method, Direct method, Audio-Lingual method;Structural approach, Communicative language teaching)
3. Teaching of Language Skills: (Teaching of Listening, Speaking, Reading, and Writing Skills; Teaching of Grammar and Functional English; Teaching of Vocabulary; Classroom techniques; Useof authentic materials) Teaching literature.
4. Testing and Evaluation: (Principles, Types, Objectives of testing and evaluation)
5. Phonetics and Phonology; Syntax and Structure.

IV. Literary comprehension - (Excerpts from poetry and prose for comprehension)

Written Examination Syllabus for the post of Degree College Lecturers in Residential Educational Institutions Societies

3. Paper – II: Mathematics

I. Real Analysis

Finite, Countable and Uncountable sets – Real Number system R – Infimum and Supremum of asubset of R – Bolzano- Weierstrass Theorem- Sequences- Convergence- Limit Superior and LimitInferior of a Sequence- Sub sequences- Heine- Borel Theorem- Infinite Series – Tests of Convergence-Continuity and Uniform continuity of a real valued function of a real variable-Monotonic Functions- Functions of Bounded Variation- Differentiability and Mean Value Theorems- Riemann Integrability-Sequences and Series of Functions

II. Metric Spaces

Metric spaces – Completeness- Compactness- Connectedness – Continuity and Uniform continuity ofa function from one metric space into another-Topological Spaces – Bases and Subbases – Continuousfunctions

III. Elementary Number Theory

Primes and Composite numbers – Fundamental Theorem of Arithmetic – Divisibility – Congruences– Fermat's theorem – Wilson's Theorem – Euler's Phi - Function

IV. Group Theory

Groups- Subgroups- Normal Subgroups- Quotient groups- Homomorphisms- IsomorphismTheorems-Permutation groups- Cyclic groups- Cayley's theorem. Sylow's theorems - Their applications

V. Rings and Fields

Rings- Integral domain- Fields- Subrings - Ideals – Quotient rings – Homomorphisms – Prime ideals-Maximal ideals – Polynomial rings – Irreducibility of polynomials – Euclidean domains-Principalideal domains-Algebraic, Normal, Separable extensions of fields- Galois Theory

VI. Vector Spaces

Vector Spaces, Subspaces – Linear dependence and independence of vectors – basis and dimension –Quotient spaces – Inner product spaces – Orthonormal basis – Gram- Schmidt process.

VII. Functional Analysis

Normed Linear Spaces- Banach Spaces -Inner Product Spaces- Hilbert Spaces-Linear Operators-LinearFunctionals- Open Mapping Theorem- Closed Graph Theorem- Uniform Boundedness theorem- Hahn– Banach Theorem

VIII. Theory of Matrices

Linear Transformations – Rank and nullity – Change of bases- Matrix of a Linear Transformation –Singular and Non-singular matrices – Inverse of a matrix – Eigenvalues and Eigenvectors of a matrixand of a Linear Transformation – Cayley- Hamilton's theorem- Quadratic forms-Signature and Index

IX. Complex Analysis

Algebra of Complex Numbers – The Complex Plane – Complex Functions and Their Analyticity – Cauchy-Riemann equations – Mobius transformations- Power Series-Complex Integration – Cauchy'sTheorem – Morera's Theorem – Cauchy's Integral Formula – Liouville's Theorem – Maximum ModulesPrinciple – Schwarz's Lemma – Taylor's Series – Laurent's Series-Calculus of Residues – Evaluationof Integrals

X. Ordinary Differential Equations

Ordinary Differential Equations (ODE) of First order and First degree – Different methods of solvingthem – Exact Differential equations and Integrating factorsODE of First order and Higher degree – Equations solvable for p, x and y – Clairaut's equations –Singular Solutions-Linear Differential Equations with Constant Coefficients and Variable Coefficients– Variation of Parameters

XI. Partial Differential Equations

Formation of Partial Differential Equations (PDE) – Lagrange and Charpit's methods for Solving firstorder PDEs – Cauchy problem for first order PDEs- Classification of Second Order PDE's – GeneralSolution of Higher Order PDEs with Constant Coefficients

XII. Solid Geometry

The Plane- Right line- Sphere- Cones and Cylinders

Written Examination Syllabus for the post of Degree College Lecturers in Residential Educational Institutions Societies

4. Paper – II: Statistics

1. **Probability:** Sample space, events, relations among events, classical and relative frequency definitions of probability, probability as a measure. Basic results on probability of events. Conditional probability and Baye's theorem. Independence of events.

Random variables (discrete and continuous). Distribution function and its properties. Joint distribution of two and more random variables. Marginal, conditional distributions and densities. Expectation of random variables, moments and generating functions. Conditional expectation. Characteristics function and its properties. Inversion theorem. Statement of continuity theorem.

Convergence of a sequence of events. Borel – Cantelli lemma, Borel 0-1 law and statement of Kolmogorov 0-1 law with applications. Convergence of a sequence of random variables. Convergence in law, in probability, with probability one and in quadratic mean and other inter-relationships. Convergence in law of $X_n + Y_n$, X_nY_n and X_n/Y_n. Definition and examples of weak law of large numbers. Khintchene's theorem and strong law of large numbers.

Statement of CLT. Lindberg-Levy and Liapunov forms of central limit theorems, statement of Lindberg – Feller form of CLT with simple illustrations.

Stochastic processes with examples. Markov Chains transition probability matrix and classification of states of a Markov chain with examples.

2. **Distribution Theory :** Theoretical distribution – Binomial, Poisson, negative binomial, geometric, hypergeometric, multinominal, rectangular, normal, lognormal, exponential, gamma, beta, Cauchy, weibull and Pareto distributions with properties.

Transformation of random variables. Distribution of Chi – squares, t and F distributions and their properties. Distribution of $\overline{X}$ and s^2 for samples coming from normal population. Distribution of order statistics and range. Joint and marginal distribution of order statistics. Distribution of sample quantiles.

Multivariate normal distribution and its marginal and conditional distribution with examples. Simple correlation and lines of regression.

3. **Estimation:** Unbiasedness, sufficiency, consistency and efficiency of a point estimate with examples. Statement of Neyman's factorization criterion with applications. Minimum variance unbiased estimation, Crammer – Rao lower bound and its applications. Rao – Blackwell theorem, completeness and Lehman – Scheffe theorem. Estimation by method of maximum likelihood, moments and statement of its properties. Confidence intervals for the parameters of normal, exponential, binomial and Poisson distribution.

4. **Testing of Hypotheses:** Concepts of tests of statistical hypothesis, types of error, level of significances, power, critical region and test function. Concepts of MP and UMP tests. Neyman – Pearson lemma and its applications, one parameter exponential family of distributions. Concepts of unbiased and consistent tests. Likelihood ratio (LR) criterion with simple applications (including homogeneity of variances). Statements of asymptotic properties of LR tests. Large sample tests of population means, proportions and correlation coefficients. Relation between confidence intervals, and hypothesis testing. Wald's SPRT for testing a simple null hypothesis against simple alternative hypothesis and its OC and ASN functions. SPRT procedure for binomial, Poisson, normal and exponential distributions.

5. **Non – Parametric Tests :** Non – parametric tests for (i) one sample case: sign test, Wilcoxon signed rank test for symmetry, runs test for randomness, Kolmogorov – Smirnov (k-s) test for goodness of fit (ii) two sample case: sign and Wilcoxon tests for paired

comparisons. Wilcoxon - Mann Whitney test and K –S test and test for independence based on spearman's rank correlation. Kruskal-Wallis test and Friedman's test.

6. Multivariate Tests: Principal Component Analysis, Factor analysis, Canonical Correlation, Cluster analysis. Multivariate tests based on Hotelling's T^2 and Mahalanobis D^2 statistics for one sample problem, two sample problem and classificatory problems between two normal populations based on Fisher's discriminant function.

7. Sampling Techniques: Estimation of population mean, population total and variance of the estimator in the following sampling methods: simple random sampling with and without replacements and equal and unequal probabilities. Horwitz Thompson and Yates and Grundy estimators. Selection of sample and determination of sample size. Stratified random sampling, proportional and optimum allocations and comparisons. Systematic sampling with N=nk and comparisons in populations with linear trend. Cluster sampling with clusters of equal and unequal sizes. Two stage sampling with equal and unequal first stage units. Ratio and regression estimation in case of simple random sampling and stratified random sampling. Non – sampling errors.

8. Linear Models and Analysis of Experimental Designs: Gauss – Markov linear model, BLUE for linear functions of parameters Gauss – Markov theorem, analysis of multiple regression models, multiple and partial correlations. Tests of hypothesis on regression and correlation parameters, tests of sub – hypothesis. Aitken's generalized least squares. Concept of multicollinearity.

Introduction of selecting the best regression equation, all possible regressions: backward, stepwise regression procedures. Variations on these methods. Probit and logit analysis, Introduction to non-linear regression model building, least squares in non-linear case, estimating the parameters, non-linear growth models.

Statement of Cochran's theorem for quadratic forms, analysis of variance one – way classification model, two – way classification model with one - observation per cell with more than one (equal) observations per cell with interaction. Fisher's least significance difference (LSD) method. Analysis of covariance one-way and two – way classification. Fundamental principles of experimental designs. Analysis of completely randomized design (CRD), Randomized Block Design (RBD), and Latin Square design (LSD). Analysis of RBD and LSD with one and more than one observation missing.

Estimation of main effects, interactions and analysis of 2^2, 2^3, 2^4, 2^n and 3^2 factorial experiments. Total and partial confounding of 2^2, 2^3, 2^4 and 3^2 factorial designs. Concept of balanced partial confounding. Fractional factorial designs. Split plot design and its analysis.

Balanced incomplete block design (BIBD) - parametric relations, Intra – block analysis and recovery of inter block information. Partially balanced incomplete block design with two associate classes (PBIBD (2)) – parametric relations and intra –block analysis. Youden Square design, Lattice design and intra – block analysis of simple lattice design.

9. Optimization Techniques - I : Meaning and scope of Operations research, formulation of Linear programming problem (LPP), rule of steepest ascent, and θ-rule, optimum solution for Linear programming problem by graphical method and simplex algorithm using artificial variables (Big M/penalty method and two phase simplex methods). Dual of a symmetric Linear programming problem and reading the optimal solution to the dual from the optimum simplex table of primal. Complementary slackness theorem, dual simplex algorithm.

Definition of transportation problem, initial basic feasible solution by North West, matrix minimum methods and VAM. Optimal solution through MODI tableau for balanced and unbalanced transportation problem, degeneracy in transportation problem, transportation problems as a special case of linear programming problem. Assignment problem as a special case of transportation problem and LPP. Optimal solution using Hungarian method.

Sequencing: Optimal sequence of 'n' jobs on two and three machines without passing.

10. <u>Optimization Techniques - II :</u>Non–linear programming problem – Formulation, generalized Lagrange multiplier technique, Kuhn - Tucker necessary and sufficient conditions for optimality of an NLPP.

Game theory: 2 person zero sum game, pure strategies with saddle point, principles of dominance and games without saddle point.

Introduction to simulation, generation of random numbers for uniform, Normal, Exponential, Cauchy and Poisson distributions. Estimating the reliability of the random numbers, simulation to queuing and inventory problem.

Queuing Theory: Introduction, essential features of Queuing system, operating Characteristics of Queuing system (transient and steady states). Queue length, General relationships among characteristics. Probability distribution in queuing systems, distribution of Arrival and inter arrival. Distribution of death (departure) process, service time .Classification of Queuing models and solution of Queuing models; M/M/1: ∞/FIFO and M/M/1: N/FIFO.

Main Examination Syllabus for the post of Degree Lecturers in Residential Educational Institutions Societies

5. Paper – II: Physics

I. Mathematical Methods of Physics

Dimensional analysis, vector algebra and vector calculus. Linear algebra, matrices, cayley- HamiltonTheorem. Eigenvalues and eigenvectors. Linear ordinary differential equations of first & second order,special functions (Hermite, Bessel, Laguerre and Legendre functions). Fourier series, Fourier andLaplace transforms. Elements of complex analysis, analytic functions; Taylor & Laurent series: poles,residues and evaluation of integrals. Elementary probability theory, random variables, binomial, Poissonand normal distributions. Central limit theorem.

II. Classical Mechanics

Newton's laws. Dynamical systems, Phase space dynamics, stability analysis. Central force motions.Two body collisions-scattering in laboratory and centre of mass frames. Rigid body dynamics-momentof inertia tensor. Non-inertial frames and pseudo forces. Variational principle. Generalizedcoordinates.Lagrangian and Hamiltonian formalisms and equations of motion. Conservation laws andcyclic coordinates. Periodic motion: small oscillations, normal modes. Special theory of relativity-Lorentz transformations, relativistic kinematics and mass-energy equivalence.

III. Electromagnetic Theory

Electrostatics: Gauss's law and its applications, Laplace and Poisson equations, boundary valueproblems. Magneto statics: Biot-savart law, Ampere's theorem. Electromagnetic induction. Maxwell'sequations in free space and linear isotropic media; boundary conditions on the fields at interfaces.Scalar and vector potentials, gauge invariance. Electromagnetic waves in free space. Dielectrics andconductors. Reflection and refraction, polarization, Fresnel's law, interference, coherence anddiffraction. Dynamics of charged particles in static and uniform electromagnetic fields. Charges particlesin inhomogeneous fields.

IV. Quantum mechanics

Wave-particle duality. Schrodinger equation (time-dependent and time-independent). Eigenvalueproblems (particle in a box, harmonic oscillator,etc..).Tunnelling through a barrier. Wave function incoordinate and momentum representations. Commutators and Heisenberg uncertainty principle. Diracnotation for state vectors. Motion in a central potential: Orbital angular momentum, angular momentumalgebra, spin, addition of angular momenta; Hydrogen atom. Stem-Gerlach experiment. Timeindependent perturbation theory and applications. Variational method. Time dependent perturbationtheory and Fermi's golden rule.Selactin rules. Identical practices. Pauli exclusion principle.spin-statisticsconnection.

V. Themrdynamics and statistical Physics

Laws of thermodynamics and their significance. Thermodynamic potentials, Maxwell relations,chemical potential, Phase equilibria. Phase space. Micro and macro- states. Micro-canonical, canonicaland grand-canonical ensembles and partition functions. Free energy and it's connection withthermodynamic quantities. Classical and quantum statistics. Bose and Fermi gases. Principle of detailedbalance. Black body radiation and Planck's distribution law

VI. Electronics

Semiconductor devices (diods, junctions, transistors, field effect devices, homo- and hetero junctiondevices), device structure, device characteristics, frequency dependence and applications. Optoelectronicdevices (solar cells, photo detectors, LEDs). Rectifiers and power supplies. Feedbackamplifiers and their frequency response. Oscillators, Multivibrators. Operational amplifiers and theirapplications, Digital techniques and applications (Logic circuits, registers, counters and Comparators).A/D and D/A converters. Microprocessors, micro controller basics. Fundamentals of AMcommunication, FM communication and Fibre optic communication and their techniques.

VII. Atomic & Molecular Physics

Quantum States of an electron in an atom. Electron spin. Spectrum of Helium and alkali atom.Relativistic corrections for energy levels of hydrogen atom, hyper fine structure

and isotopic shift,width of spectrum lines, LS &JJ couplings. Zeeman, Paschen-Bach & Stark effects. Frank-Condonprinciple. Electronic rotational, vibrational and Raman spectra of diatomic molecules. Selection rules.Lasers: spontaneous and stimulated emission, Einstein A & B coefficients. Optical pumping, Populationinversion, rate equation. Modes of resonators and coherence length.

VIII. Condensed Matter Physics

Bravais lattice. Reciprocal lattice. Diffraction and the structure factor. Bonding of solids. Elasticproperties, Phonons, lattice specific heat. Free electron theory and electronic specific heat. Responseand Relaxation phenomena. Drude model of electrical and thermal conductivity. Hall Effect andthermoelectric power. Electron motion in a periodic potential, band theory of solids; metals, insulatorsand semiconductors. Super conductivity: Type-I and type-II super conductors. Josephson junctions.Superfluidity. Defects and dislocations. Ordered phases of matter: translational and orientation order,kinds of liquid crystalline order. Quasi crystals.

IX. Nuclear and Particle Physics

Basics of radio activity. Basic nuclear properties; size, shape and charge distribution, spin and parity.Binding energy, Semi-empirical mass formula, liquid drop model. Nature of the nuclear force, form ofnucleon-nucleon potential, charge –independence and charge symmetry of nuclear forces. Deuteronproblem. Evidence of shell structure, single-particle shell model, its validity and limitations. Elementaryideas of alpha, beta and gamma decays and their selection rules. Fission and fusion. Nuclear reactions.Reaction mechanism, compound nuclei and direct reactions.

X. Mathematical Methods of Physics

Green's function. Partial differential equations (Laplace, wave and heat equations in two and threedimensions). Elements of computational techniques: root of functions, interpolation, and extrapolation,integration by trapezoid and Simpson's rule, solution of first order differential equation using Rungekuttamethod. Finite difference methods. Tensors. Introductory group theory.

XI. Classical Mechanics

Basic concepts of Dynamical systems, Poisson brackets and canonical transformations. Symmetry,invariance and Noether's theorem. Hamilton-Jacobi theory.

XII. Electromagnetic Theory

Dispersion relations in Plasma. Lorentz invariance of Maxwell's equation. Transmission lines andwave guides. Radiation-from moving charges and dipoles and retarded potentials.

XIII. Quantum Mechanics

Spin-Orbit coupling, fine structure. WKB approximation. Elementary theory of scattering: Phase shifts,partial waves, Born approximation. Relativistic quantum mechanics: Klein- Gordon and Dirac equations.Semi- classical theory of radiation.

XIV. Thermodynamics and Statistical Physics

First- and second-order phase transitions. Diamagnetism, paramagnetism and ferromagnetism. Isingmodel. Bose-Einstein condensation. Diffusion equation. Random walk and Brownian motion. Introduction to non equilibrium processes.

XV. Condensed Matter Physics

Phase contrast microscopy, Thermo gravimetric analysis. Differential scanning calorimetry. Theoryand applications of Massbauer effect. Electron Spin Resonance (ESR), Nuclear Magnetic Resonance(NMR), Chemical shift and applications. X-ray diffraction technique, scanning electron microscopyand transmission electron microscopy and their applications.

XVI. Nuclear and Particle Physics

Classification of fundamental forces. Elementary particles and their quantum numbers (charge, spin,parity, isospin, strangeness, etc.). Quark model, baryons and mesons. C, P, and T invariance. Applicationsof symmetry arguments to particle reactions. Parity non-conservation in week interaction. Relativistickinematics.

Written Examination Syllabus for the post of Degree College Lecturers in Residential Educational Institutions Societies

6. Paper – II: Chemistry

Inorganic chemistry:

I. Atomic structure and chemical bonding – structure and bonding in homo and hetero nuclear molecules. Application of VSEPR, Valence Bond and Molecular orbital theories in explaining the structures ofsimple molecules.

II. Chemistry of main group (I to VII & Nobel gases) elements.

III. Chemistry of transition elements and inner transition elements.

IV. General principles of metallurgy: Occurrence of metals, Concentration of ores - levigation, magneticseparation, froth floatation, leaching , Extraction of crude metal from concentrated ore-conversion tooxide, reduction of oxide to the metal , Thermodynamic principles of metallurgy-Ellingham diagramlimitations,applications. Extraction of iron, copper and zinc from their oxides, Electrochemicalprinciples of metallurgy, Oxidation and reduction, Refining of crude metal-distillation, liquation poling,electrolysis, zone refining and vapour phase refining, Uses of aluminium, copper, zinc and iron.Alloys: Inter-metallic compounds

V. Concept of Symmetry in Molecules – Symmetry Operations – Symmetry Elements : Rotational Axisof Symmetry and Types of Rotational Axes, Plane of Symmetry and types of Planes, Improper RotationalAxis of Symmetry , Inversion Center and Identity Element. Molecular Point Groups: Definition andNotation of Point Groups, Classification Molecules in to C1, Cs, Ci, Cn, Cnv, Cnh , Dn , Dnh , Dnd,Sn. Td, Oh & Ih.

VI. Coordination Chemistry –IUPAC nomenclature, bonding theories – Werner's theory, EAN rule, VBT, Crystal Field Theory – Crystal Field splitting patterns in various geometries, Factors affecting onCFT. Calculation of CFSE – John Teller effect – Isomerism in complexes. Spectral and magneticproperties of Coordination complexes – Russell Sanders coupling – term symbols - charge transferspectra of complexes.

VII. Stability of metal complexes – Stepwise and overall stability constants – Factors affecting the stabilityof metal complexes - Chelate effect. Pearson's theory of hard and soft acids and bases (HSAB).

VIII. Reaction mechanism of metal complexes–Inert and labile complexes – Ligand substitution reaction ofoctahedral complexes – Acid hydrolysis, Base hydrolysis – Conjugate base mechanism – Anationreactions – Substitution reactions of square planar complexes – Trans effect – Electron transfer reactions– Inner and outer sphere mechanisms.

IX. Metal carbonyls, Nitrosyls and Metallocenes - Structure and bonding.

X. Bio-inorganic chemistry- Metal complexes as oxygen carriers-Hemoglobin and myoglobin-Oxygentransport – Non heme proteins – Hemerythrin and hemocyanin.

XI. Analytical chemistry- Chromatography – General principles involved in separations by Paper, Thinlayer, Column Chromatography, GC and HPLC.

Physical Chemistry:

I. Solutions and colligative properties: Types of solutions, Expressing concentration of solutions masspercentage, volume percentage, mass by volume percentage, parts per million, mole fraction, molarityand molality, Solubility: Solubility of a solid in a liquid, solubility of a gas in a liquid, Henry's law, Vapour pressure of liquid solutions: vapour pressure of liquid- liquid solutions. Raoult's law as aspecial case of Henry's law -vapour pressure of solutions of solids in liquids, Ideal and non-idealsolutions, Colligative properties and determination of molar mass - Relative lowering of vapour pressure,elevation of boiling point, Depression of freezing point, Osmosis and osmotic pressure-reverse osmosisand water purification. Abnormal molar masses - van't Hoff factor. Phase equilibria– Phase rule andits application to one component and two component systems

II. Acids and bases: Acids, bases and salts- Arrhenius, Bronsted-Lowry and Lewis concepts of acids andbases. Ionisation of Acids and Bases –Ionisation constant of water and it's ionic product- pH scaleionisationconstant of weak acids and weak bases-relation between Ka and Kb. Di and poly basicacids and di and poly acidic Bases-Factors affecting acid strength-Common ion effect in the ionizationof acids and bases-Hydrolysis of salts and pH of their solutions. Buffer solutions.

III. Thermodynamics: Brief review of concepts of I and II laws of thermodynamics. Concept of entropy.Entropy as a state function. Calculation of entropy changes in various processes. Entropy changes inan ideal gas. Entropy changes on mixing of ideal gases. Entropy as a function of V and T. Entropy asa function of P and T. Entropy change in isolated systems- Clausius inequality. Entropy change ascriterion for spontaneity and equilibrium.Third law of thermodynamics.Evaluation of absolute entropiesfrom heat capacity data for solids, liquids and gases.Standard entropies and entropy changes of chemicalreactions.Helmholtz and Gibbs free energies (A and G). A and G as criteria for equilibrium andspontaneity. Physical significance of A and G. Driving force for chemical reactions- relative signs of?H and ?S. Thermodynamic relations. Gibbs equations. Maxwell relations. Temperature dependenceof G. Gibbs- Helmholtz equation. Pressure dependence of G. Chemical potential: Gibbs equations fornon-equilibrium systems. Material equilibrium. Phase equilibrium. Clapeyron equation and ClausiusClapeyron equation.Conditions for equilibrium in a closed system.Chemical potential of ideal gases.Ideal-gas reaction equlibrium-derivation of equilibrium constant. Temperature dependence ofequilibrium constant - The Van't hoff equation.

IV. Electrochemistry: Conductance and its applications, Derivation of Nernst equation. Chemical andconcentration cells (with and without transference).Liquid junction potential – derivation of theexpression for L J P – its determination and elimination. Applications of EMF measurements: Solubilityproduct, potentiometric titrations, determination of transport numbers, equilibrium constantmeasurements. Decomposition potential and its significance.Electrode polarization – its causes andelimination.Concentration over potential.Concept of activity and activity coefficients in electrolyticsolutions.The mean ionic activity coefficient.Debye-Huckel theory of electrolytic solutions.Debye-Huckel limiting law.Calculation of mean ionic activity coefficient.Limitations of Debye-Huckeltheory. Extended Debye-Huckel law. Theory of electrolytic conductance.Derivation of Debye-Huckel-Onsager equation – its validity and limitations. Concept of ion association – Bjerrum theory of ionassociation (elementary treatment) - ion association constant – Debye-Huckel-Bjerrum equation.

V. Quantum chemistry: Black body radiation-Planck's concept of quantization-Planck's equation, averageenergy of an oscillator. Wave particle duality and uncertainty principle - significance for microscopicentities.Emergence of quantum mechanics. Wave mechanics and Schrödinger wave equation.Operators - operator algebra: Commutation of operators, linear operators, Complex functions, Hermitianoperators. Operators and. Eigen functions and Eigen values. Degeneracy. Linear combination ofEigen functions of an operator.Well behaved functions. Normalized and orthogonal functions.Postulates of quantum mechanics.Physical interpretation of wave function.Observables and operators.Measurability of operators.Average values of observables.The time dependent Schrodinger equation.Separation of variables and the time-independent Schrodinger equation.Theorems of quantum mechanics: Real nature of the Eigen values of a Hermitian operator - significance.Orthogonal nature of the Eigen values of a Hermitian operator-significance of orthogonality.Expansionof a function in terms of Eigen values.Eigen functions of commuting operators - significance.Simultaneous measurement of properties and the uncertainty principle.Particle in a box- Particle in one and three dimensional box. Plots of ?and ?2 discussion, Degeneracyof energy levels. Comparison of classical and quantum mechanical particles. Calculations using wavefunctions of the particle in a box-orthogonality, measurability of energy, position and momentum,average values and probabilities.

VI. Chemical kinetics: Theories of reaction rates - Collision theory, Transition state theory, Reactioncoordinate, activated complex and the transition state. Thermodynamic formulation of transition statetheory. Unimolecular reactions and Lindeman's theory.

VII. Complex reactions - Opposing reactions, parallel reactions and consecutive reactions. Chain reactions- general characteristics, steady state treatment - H2 - Br2 reaction. Derivation of rate law. Effect ofstructure on reactivity- Linear free energy relationships. Hammett and Taft equations – substituent (sand s*) and reaction constant (? and ?*) with examples.Michealis-Menten mechanism of enzyme catalyzed reactions - derivation of kinetic equation and itsapplications.

VIII. Photochemistry: Electronic transitions in molecules - The Franck Condon principle. Electronicallyexcited molecules- singlet and triplet states. Radiative life times of excited states-theoretical treatment.Measured lifetimes. Quantum yield and its determination. Actinometry - ferrioxalate and uranyl oxalateactinometers. Derivation of fluorescence and phosphorescence quantum yields. E-type delayedfluorescence-evaluation of triplet energy splitting (?EST). Laws of photo chemistry, Photo physicalprocesses, photo physical kinetics of unimolecular reactions. Calculation of rate constants of variousphoto physical processes, State diagrams, photochemical primary processes. Types of photochemicalreactions- electron transfer, photo dissociation, addition, abstraction, oxidation and isomerisationreactions with examples. Effect of light intensity on the rates of photochemical reactions.Photosensitization. Quenching-Stern Volmer equation. Experimental set up of a photochemical reaction.Introduction to fast reactions- Principles of flash photolysis.

IX. Solid state chemistry: General characteristics of solid state. Classification of crystalline solids basedon different binding forces, probing the structure of solids: X-ray crystallography, Crystal lattices andunit cells. Bravais lattices- primitive and centred unit cells, Number of atoms in a unit cell (primitive,body centred and face centred cubic unit cell), Close packed structures: Close packing in one dimension,in two dimensions and in three dimensions- tetrahedral and octahedral voids- formula of a compoundand number of voids filled- locating tetrahedral and octahedral voids, Packing efficiency in simplecubic, bcc and in hcp, ccp lattice. Calculations involving unit cell dimensions density of the unit cell.Imperfections in solids-types of point defects-stoichiometric and non-stoichiometric defects.Magneticproperties of solids-classification of magnetic materials, Magnetic susceptibility, Langevindiamagnetism, Weiss theory of para magnetism. Magnetic properties of solids - classification ofmagnetic materials, Magnetic susceptibility, Langevin diamagnetism, Weiss theory of para magnetism

X. Electronic properties of metals, insulators and semi conductors: Electronic structure of solids, Bandtheory, band structure of metals, insulators and semiconductors. Electrons holes and excitons. Thetemperature dependence of conductivity of extrinsic semi conductors. Photoconductivity andphotovoltaic effect.

XI. Superconductivity. Occurrence of superconductivity. Destruction of superconductivity by magneticfields-Meisner effect. Types of superconductors. Theories of super conductivity- BCS theory.

Organic Chemistry:

I. IUPAC nomenclature of organic molecules. Isomerism – classification of isomers.

II. Classification, preparations and properties of alkane, alkenes, alkynes, cyclo alkanes, aromatichydrocarbons, halogen compounds, hydroxy compounds, carbonyl compounds, carboxylic acids andits derivatives.

III. Stereo chemistry: Molecular representations (Wedge, Fisher, Newman and Saw-horse projectionformula) their description and interconversions. Stereoisomers – classification- configuration- R,SNomenclature,criteria for chirality, Axial chirality of allenes, spiranes, alkylidenes, Cycloalkanes,chiral biaryls - Atropisomerism. Planar chirality of ansa compounds and trans- cyclooctene.Helicalchiral compounds.Determination of absolute configuration by chemical correlation methods.Determination of configuration in E,Z- nomenclature. Spectral and chemical methods for determinationof E, Z- configuration, including aldoxime and ketoximes. Asymmetric synthesis: Topicity, pro-chirality,stereoslectivity, enatioselectivity and diastereoselectivity. Asymmetric aldol reaction and Diel’s alderreaction.

IV. Introduction to conformational isomerism, Klyne - Prelog terminology for conformers and torsionangles, dihedral angle, Steric strain and the concept of dynamic

stereoisomerism. Study of conformationsof acyclic compounds like ethane, butane, dihalobutanes, halohydrin, ethylene glycol, butane-2, 3-diol, amino alcohols and 1,1,2,2-tetrahalobutanes. Study of conformations of cyclic compounds -cyclo pentane, cylohexane, cyclohexanone, and its derivatives.

V. Nature of bonding in organic molecules and aromaticity, delocalized chemical bonding, conjugation,cross conjugation, resonance, hyperconjugation, tautomerism, Huckel's Rule and the concept ofaromaticity- Aromaticity, non-aromaticity and anti aromaticity. Aromaticity of benzenoid and nonbenzenoidcompounds, alternant and non-alternant hydrocarbons, Azulenes, Fulvenes and Annulenes.Metallocenes- Ferrocene.

VI. Reactive intermediate: Generation, detection, structure, stability and reactivity of carbocation, carbanion,free radical, carbene and nitrene. Molecular rearrangements: definition and classification, molecularrearrangements involving 1). Electron deficient carbon: Wagner - Meerwein, Pinacol-Pinacolone, allylicand Wolf rearrangement. 2). Electron deficient Nitrogen: Hofmann, Lossen, Curtius, Schmidt andBeckmann rearrangements. 3) Electron deficient Oxygen: Baeyer-Villiger oxidation. 4). Base catalysedrearrangements: Benzylic acid, Favourski, Tran annular, Sommlett-Hauser and Smile rearrangement.

VII. Organic reaction mechanism: Mechanism, stereochemistry and energy profile diagram of Additionreactions to polar and non polar double bonds. Substitution reactions: Mechanism, rate law,stereochemistry and factors affecting on aliphatic and aromatic reactions. Elimination reactions-mechanism,rate law, stereochemistry, orientation and factors affecting on E1, E2, E1CB, pyrolyticsyn elimination and a-elimination, elimination vs substitution. Detection of reaction mechanism byproduct isolation, isotopic labelling, chemical trapping and crossover experiments.

VIII. Oxidation- Swern, Cr (VI) oxidants, Oxidative cleavage of 1,2-diols - Periodic acid and Lead tetraacetate.

IX. Reductions - Wilkinsons's catalytic hydrogenation, LiAlH4, NaBH4, BH3, AlH3 and DIBAL.

X. Synthetic strategies: Target selection, terminology, disconnection approach, C-C bond disconnections.

XI. Heterocyclic chemistry: importance as drugs, nomenclature, classification based on size of the ring,number and nature of hetero atoms. Synthesis and reactivity of Pyrrole, furan, Thiophene, pyridine,Indole, Benzothiophene, Quinoline, Isoqunolines.

XII. Alkaloids and Terpenoids- importance as drugs, isolation of natural products by steam distillation,solvent extraction and chemical methods. Structure determination and synthesis of papverine, nicotineand quinine. General methods in the structure determination of Terpenes, isoprene rule, special isoprenerule, structure determination of a-Terpeniol and camphor.

XIII. Organic photochemistry: photochemical energy, Frank-Condon principle, Jablonski diagram, Electronictransitions, photosensitization, quenching, quantum efficiency, quantum yield, photochemistry ofcarbonyl compounds n?p* and p?p* transitions. Norrish type-I and Norrish type-II cleavages. Paterno-Buchi reactions, Photoreduction, photochemistry of enones- hydrogen abstraction, rearrangements ofa,ß-unsaturated ketones and cyclohexadienones, photochemistry of p-benzoquinones, Dienes - photochemistry of 1,3- butadiene, (2+2) additions, Di-p-methane rearrangement, photochemistry ofaromatic compounds, excited states of benzene and its 1,2-, 1,4-additions.

XIV. Pericyclic reactions: Classification, Stereochemistry of pericyclic reactions, Molecular Orbitals andSymmetry of ethelene, 1,3-butadiene, 1,3,5-hexatriene, allylic, 1,3-pentadienyl and 1,3,5- heptatrienylp- systems. Analysis of pericyclic reactions by PMO, FMO and orbital correlation methods.

XV. Basic principles, concepts of UV, IR, H1NMR, C13NMR and Mass spectroscopic methods – structuredetermination of organic compounds by UV, IR, H1NMR, C13NMR and Mass spectroscopic methods.

XVI. Green chemistry: Principles of Green chemistry, and its approaches.

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7. Paper – II: Botany

I. Phycology, Mycology, Bacteria and Viruses

Phycology : Thallus organization ; cell ultra structure ; reproduction (vegetative, sexual, asexual) ; criteriafor classification of algae : pigments, reserve food, flagella ; classification, salient features of Chlorophyta,Charophyta, Xanthophyta, Bacillariophyta, Phaeophyta and Rhodophyta ; algal blooms and toxic algae,algal biofertilizers ; algae as food,and feed and role of algae in industry.

Mycology : General characters of fungi ; substrate relationship in fungi ; cell ultrastructure ; unicellular andmulticellular organization ; cell wall composition ; nutrition (saprobic, biotropic, symbiotic) ; reproduction(vegetative, asexual, sexual) ; heterothallism ; heterokaryosis parasexuality ; Molecular aspects inclassification.

General account of Mastigomycotina, Zygomycotina, Ascomycotina, Basidiomycotina, Deuteromycotina ;fungi in industry, medicine and as food ; fungal diseases in plants and humans ; Mycorrhizae ; fungi asbiocontrol agents.

Bacteria- ultrastructure and biochemistry of cell wall, nutritional types, reproduction,Plasmids.

Viruses- Characters and ultrastructure of virions and symptomatology and transmission of plant viruses.Mollicuties general characters of spiroplasmas and phytoplasmas Importance of microorganisms : Microbesin medicine, agriculture and environment.

II. Bryophyta, Pteridophyta and Gymnosperms

Bryophyta : Morphology, structure, reproduction and life history ; distribution ; classification., ofMarchantiales, Junger maniales, Anthoceratales, Sphagnales, Funariales and Polytrcales ; economic andecological importance.

Pteridophyta : Morphology, anatomy and reproduction ; classification of Psilo psida, Lycopsida, Sphenopsidaand Pteropsida; evolution of stele ; heterospory and origin of seed habit; general account of fossil pteriodophyts.

Gymnosperms- Introduction and classification, Structure and reproduction of Cycadales, Ginkgoales,Coniferales, Ephedrales, Welwitschiales and Gnetales.

III. Taxonomy Of Angiosperms

The species concept : Taxonomic hierarchy, species, genus, family and other categories ; principles used inassessing relationship, delimitation of taxa and attribution of rank.

Salient features of the International Code of Botanical nomenclature.

Taxonomic tools : Herbarium ; floras ; histological, cytological, phytochemical, serological, biochemicaland molecular techniques ; computers and GIS.

Systems of angiosperm classification : Phenetic versus phylogenetic systems ; cladistics in taxonomy ;relative merits and demerits of major systems of classification.

Study of the following families- Magnoliaceae, Malvaceae, Rutaceae, Apocynaceae, Asclepiadaceae,Lamiaceae, Amaranthaceae and Poaceae.

IV. Plant Anatomy And Embryology

Shoot development: Organization of the shoot apical meristem (SAM); control of cell division and cell tocell communication; control of tissue differentiation especially xylem and phloem ; secretory ducts andlaticifers.

Phyllotaxy and leaf differentiation

Root Development: Organization of root apical meristem (RAM); vascular tissue differentiation; homeoticmutants in Arabidopsis and Antirrhinum,

Male gametophyte: Structure of anthers; microsporogenesis, role of tapetum; pollen development and geneexpression; male sterility; sperm dimorphism and hybrid seed production; pollen germination, pollen tubegrowth and guidance ; pollen storage ; pollen allergy, pollen embryos.

Female gametophyte: Ovule development; megasporogenesis; organization of the embryo sac, structure ofthe embryo sac cells.

Pollination, pollen – pistil interaction and fertilization : Floral characteristics, pollination mechanisms andvectors; self-incompatibility; double fertilization.

Seed development and fruit growth: Endosperm development during early, maturation and desiccation stages;embryogenesis, cell lineages during late embryo development; storage proteins of endosperm and embryo;polyembryony; apomixes; embryo culture; fruit maturation.

Dormancy: Seed dormancy; overcoming seed dormancy; bud dormancy.

Senescence and programmed cell death (PCD): Types of cell death, PCD in the life cycle of plants, metabolicchanges associated with senescence and its regulation; influence of hormones and environmental factors onsenescence.Embryology related to taxonomy.

V. Plant Resource Utilisation and Conservation

Origin, evolution, botany, cultivation and uses of (i) Food forage and fodder crops (ii) fibre crops (iii)medicinal and aromatic plants and (iv) vegetable oil-yielding crops. Ethnobotany – Scope and objectives ofethnobotany.

Important fire-wood and timber – yielding plants and non-wood forest products (NWFPs) such as bamboos,rattans, raw materials for paper-making, gums, tannins, dyes, resins and fruits.

Role of plants in Medicine- morphology, active principles and medicinal value of the following plants-Andrographis, Asparagus, Phyllanthus, Gymnema.

Principles of conservation; extinctions; environmental status of plants based on International Union forConservation of Nature.

Strategies for conservation – in situ conservation : International efforts and Indian initiatives ; protectedareas in India – sanctuaries, national parks, biosphere reserves, wetlands, mangroves and coral reefs forconservation of wild biodiversity.

Strategies for conservation – ex situ conservation : Principles and practices; botanical gardens, field genebanks, seed banks, in vitro repositories, cryobanks; general account of the activities of Botanical Survey ofIndia (BSI), National Bureau of Plant Genetic Resources (NBPGR), Indian Council of Agricultural Research(ICAR), Council of Scientific and Industrial Research (CSIR) and the Department of Biotechnology (DBT)for conservation, non-formal conservation efforts.

VI. -Plant Ecology

Climate, soil and vegetation patterns of the world: Life zones; major biomes and major vegetation and soltypes of the world.

Vegetation organization: Concepts of community; analytical and synthetic characters of community.

Population characters, interactions of species- positive and negative interactions of species.

Ecological succession: types, changes involved in succession, concept of climax.

Biotic and abiotic interactions, habitat and niche, allopatric and sympatric spaciation.

Ecosystem organization: Structure and functions; primary production methods of measurement of primaryproduction, ; energy dynamics (trophic organization, energy flow Pathways, ecological efficiencies); foodchains, wood web and ecological pyramids, global biogeochemical cycles of C,N, in terrestrial and aquaticecosystems.

Biological diversity: Concept and levels; speciation and extinction; IUCN categories of threat; distributionand global patterns, hot spots; endemism, inventory.

Air, water and soil pollution: Kinds, sources, effects on plants and ecosystems.

Climate change: Green house gases (CO_2, CH_4, N_2O, CFCs: sources, trends and role); ozone layer andozone depletion ; consequences of climate change (CO_2 fertilization, global warming, sea level rise, UVradiation).

Ecosystem stability : Concept (resistance and resilience); ecological perturbations (natural and anthropogenic)and their impact on plants and ecosystems ; ecology of plant invasion ;Biogeographical zones of India, Flora of Telangana – vegetational types.

VII. -Cell Biology

Ultrastructure and functions of cell organelles. Cell wall, Plasma membrane Plasmodesmata, Chloroplast,Mitochondria, Plant Vacuoles, Nucleus, Ribosomes,Cell cycle and apoptosis : Control mechanisms; role of cyclins and cyclin dependent kinases; retinoblastomaand E2F proteins; cytokinesis and cell plate formation; mechanisms of programmed cell death. Mitosis andmeiosis its significance

Other cellular organelles: Structure and functions of microbodies, Golgi apparatus, lysosomes, endo plasmicreticulum.

Techniques in cell biology: Immuno techniques; in situ hybridization, FISH, GISH; Electron microscopy.

VIII. Cytogenetics

Chromatin organization : Chromosome structure and Packaging of DNA, molecular organization ofcentromere and telomere; nucleolus and ribosomal RNA genes ; euchromatin and heterochromatin ; karyotypeanalysis ; banding patterns ; specialized types of chromosomes ; polytene, lampbrush, B-chromosomes andsex chromosomes ; molecular basis of chromosome pairing.

Structural and numerical alterations in chromosomes : Duplication, deficiency, inversion and translocation; autopolyploids ; allopolyploids ; evolution of major crop plants.

Genetics of prokaryotes and eukaryotic organelles : genetic recombination in phage ; genetic transformation,conjugation and transduction in bacteria ; genetics of mitochondria and chloroplasts cytoplasmic male sterility.

Gene structure and expression : Genetic fine structure ; cis – trans test ; Benzer's experiment; introns andtheir significance ; RNA splicing ; regulation of gene expression in prokaryotes and eukaryotes.

Mutations : Spontaneous and induced mutations ; physical and chemical mutagens ; molecular basis of genemutations ; transposable elements in prokaryotes and eukaryotes ; mutations induced transposons ; site-directedmutagenesis ; DNA damage and repair mechanisms.

Plant Breeding: Principles and methods of plant breeding ; Marker assisted breeding.

Biostatistics : Mean, Variance, Standard deviation, Standard error, Student't' test, chi-square and ANOVA.

Molecular cytogenetics : Nuclear DNA content; C-value paradox; cot curve and its significance; restrictionmapping – concept and techniques ; multigene families and their evolution.

IX. Plant Physiology

Energy flow : Principles of thermodynamics, free energy and chemical potential, redox reactions, structureand functions of ATP.

Fundamentals of enzymology : General aspects, allosteric mechanism, regulatory and active sites, isoenzymes,kinetics of enzymatic catalysis, Michaelis – Menton equation and its significance.

Membrane transport and translocation of water and solutes: Plant water relations, mechanism of watertransport through xylem, passive and active solute transport, membrane transport proteins.

Signal transduction: Receptors and G-proteins, phospholipid signaling, role of cyclic nucleotides, calciumcalmodulin cascade, diversity in protein kinases and phosphatases.

Photochemistry and photosynthesis: Photosynthetic pigments and light harvesting complexes, photo oxidationof water, mechanisms of electron and proton transport, carbon assimilation – the Calvin cycle, photorespirationand its significance, the C4 cycle, the CAM pathway, biosynthesis of starch and sucrose.

Respiration and lipid metabolism : Glycolysis, the TCA cycle, electron transport and ATP synthesis, pentosephosphate pathway, glyoxylate cycle, alternative oxidase system, structure and function of lipids, fatty acidbiosynthesis, synthesis of membrane lipids, structural lipids and storage lipids and their catabolism.

Nitrogen fixation and metabolism : Biological nitrogen fixation, nodule formation and nod factors, mechanismof nitrate uptake and reduction, ammonium assimilation.

Photobiology : Photochromes and cryptochromes, photophysiology of light –induce responses, cellularlocalization.

Plant growth regulators and elicitors : Physiological effects and mechanism of action of auxins, gibberellins,cytokinins, ethylene, abscisic acid, brassinosteroids, polymines, jasmonic acid and salicyclic acid.

The flowering process : Photoperiodism, endogenous clock and its regulation, floral induction anddevelopment – genetic and molecular analysis, role of vernalization.

Stress physiology : Plant responses to biotic and abiotic stress; mechanisms of biotic and abiotic stresstolerance, HR and SAR, water deficit and drought resistance, salinity stress, metal toxicity, freezing andheat stress, oxidative stress.

Coping with biotic stress: Chemical control, Biological control, IPM

X. Biotechnology and Genetic Engineering

Plant Biotechnology – Principles, scope and applications.

Plant cell and tissue culture : General introduction, scope, cellular differentiation, and totipotency.

Organogenesis and adventives embryogenesis : Morphogenesis; somatic embryogenesis.

Somatic hybridization : Protoplast isolation, fusion and culture.

Applications of plant tissue culture : Clonal propagation, artificial seed, production of hybrids and somaclones, production of secondary metabolites / natural products, cryopreservation and germplasm storage.

Recombinant DNA technology : Gene cloning principles and techniques, genomic / c DNA libraries, vectors,DNA synthesis and sequencing, polymerase chain reaction, DNA fingerprinting and DNA markers.

Genetic engineering of plants: Transgenic plants, Methods of gene transfer – Agrobacterium – medicatedand microprojectile, chloroplast transformation, intellectual property rights, ecological risks and ethicalconcerns.

Microbial genetic manipulation : Bacterial transformation, selection of recombinants and transformants,genetic improvement of industrial microbes.

Genomics and proteomics : High throughput sequencing, genome projects, bioinformatics, functionalgenomics, microarrays.

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8. Paper – II: Zoology

I. General Concepts:

1. Levels of structural organization - Unicellular, multi cellular and colonial forms, Prokaryotic andEukaryotic cells, Levels of organization of tissues, Organs & systems.
2. Acoelomata, Pseudocoelomata, Coelomata, Proterostomia and Deuterostomia.
3. Concepts of species and hierarchial taxa, Biological nomenclature, Classical methods of taxonomy ofanimals.

II. Non-Chordata:

1. General characters and classification of invertebrates up to order level.
2. Protozoa - Locomotion, Nutrition and reproduction in protozoa, Protozoan diseases of man– Kalaazar, Amoebiasis, Malaria, Trypanosomiasis.
3. Porifera - Canal system in Porifera, Skeleton in Porifera, Reproduction in sponges.
4. Coelenterata - Polymorphism, Metagenesis, Coral formation, Obelia.
5. Helminthes - Common Helminthic parasites of Man –Fasciola hepatica, Schistosoma, Taenia solium,Echinococus granulosus, Ascaris, Ancylostoma, Trichinella – their life cycles, Pathogenescity andclinical significance. Parasitic adaptations in Helminths.
6. Annelida- Excretory system in Annelida, Coelom formation, Coelom and coelomoducts, Metamerism.
7. Arthropoda - Mouthparts of insects, Ommatidium, Useful and harmful insects, Metamorphosis ininsects, Apicultur and Sericulture in India, Crustacean larvae, Peripatus.
8. Mollusca - Respiration, Torsion and Detorsion, Pearl formation.
9. Echinodermata - Echinoderm larvae, Water vascular system.

III. Chordata:

1. General characters and classification of chordates up to order level, Origin of chordates, Phylogenyand affinities of Hemichordata, Retrogressive metamorphosis.
2. Vertebrate integument and its derivatives, Comparative account of Digestive, Respiratory, Circulatory,Excretory and Reproductive systems of vertebrates.
3. Pisciculture in India, Common edible fishes.
4. Origin and evolution of Amphibia, Neoteny or Paedogenesis.
5. Important snakes of India, Identification of Poisonous and non- Poisonous Snakes, Poisonous Apparatus,Dinosaurs.
6. Flight adaptations and Migration in birds. Archeopteryx, Poultry.
7. Adaptive radiation in Mammals, Dentition in Mammals.

IV. Cell Biology:

1. Prokaryotic and Eukaryotic cell, Plasma membrane-Ultra structure & function.
2. Structure and function of intracellular organelles - Nucleus, Mitochondria, Golgi bodies, Lysosomes,Endoplasmic reticulum, Peroxisomes, Vacuoles, Cytoskeleton and it’s role in motility.
3. Organization of genes and chromosomes – Operon concept, unique and repetitive DNA, structure ofchromatin and chromosomes, Heterochromatin, Euchromatin, transposons.
4. Cell division- Mitosis and meiosis, Cell cycle & its regulation.
5. DNA replication, Repair and Recombination – Unit of replication, Replication origin and Replicationfork, DNA damage and Repair mechanism, Recombinant DNA technology, Transgenesis & Cloning.
6. Protein synthesis – Genetic code, Initiation, Elongation and termination.
7. Regulation of gene expression – Lac operon.

V. Genetics:

1. Mendel's law of inheritance – Gene interactions, Epistasis and Linkage.
2. Gene mapping methods - Linkage-Complete and Incomplete linkage, Linkage maps, Recombination,Mapping with molecular markers, Somatic cell hybrids.
3. Crossing over - Types (Somatic or mitotic crossing over and Germinal or meiotic crossing over)theories about the mechanism of crossing over, Tetrad analysis and cytological detection of crossingover.
4. Mutations - Types (Spontaneous and Induced), Causes and detection, Mutant types (Lethal, Conditionalbiochemical, Loss of function, Gain of function, Germinal versus somatic mutants), Molecular basisof mutations.
5. Chromosomal aberrations (Deletion, Duplication, Inversion and Translocation, Ploidy and their geneticimplications), Autosomal abnormalities (Down's syndrome, Trisomy-13, -18), Sex anamolies (Turner'ssyndrome, Klinefelter's syndrome, Hermaphroditism).
6. Human genetics - Human karyotyping, Genetic disorders due to mutant genes (Huntington's chorea),Sickle-cell anaemia (SCA), Inborn errors of metabolism-Pheynylketonuria, Alkaptonuria .

VI. System and Cell physiology:

1. Blood and Circulation - Blood corpuscles, Haemopoiesis, Plasma function, Blood groups, Haemoglobin,Haemostasis.
2. Cardiovascular system - Neurogenic, Myogenic heart, Cardiac cycle, Tachycardia and Bradycardia.
3. Respiratory system - Transport of gases, Exchange of gases, Mechanism of respiration.
4. Nervous system - Neuron, Conduction of nerve impulse, Synaptic transmission, Neurotransmitters.
5. Muscle - Ultra structure of skeletal muscle, Mechanism of muscle contraction.
6. Sense organs- Eye and Ear.
7. Excretory system - Structure & function of mammalian Kidney and Nephron, Micturition.
8. Osmoregulation - Osmoregulation in Aquatic & Terrestial animals, Hormonal control ofOsmoregulation.
9. Digestive system - Digestion, Absorption, Assimilation and Egestion.
10. Endocrinology and Reproduction - Endocrine glands, Types of hormones & Mechanism of hormonalaction, Hormonal regulation of reproduction in mammals.
11. Outline classification of organic compounds (Carbohydrates, Proteins and Lipids).
12. Order of protein structure - Primary, Secondary, Tertiary and Quaternary; Ramachandran plot.
13. Glycolysis (EMP), Kreb's cycle (TCA CYCLE), Electron transport system (Oxidative phosphorylation),Pentose phosphate pathway, Gluconeogenesis.

VII. Evolution:

1. Origin of life - Theories and Evidences of organic evolution, The modern synthetic theory.
2. Population genetics (Gene pool, Gene frequency), Herdy weinberg's law.
3. Genetic drift and Convergent evolution, Adaptive radiation.
4. Isolation and Speciation.
5. Evolution of Horse and Man.
6. Zoogeographical realms of the world.

VIII. Developmental biology:

1. Spermatogenesis and Oogenesis.
2. Fertilization, Cleavage, Gastrulation, Formation of germ layers, Parthenogenesis.

3. Formation and Function of Foetal membranes.
4. Placenta – Definition and Function.
5. Types of Placenta.
6. Development of Frog and chick.

IX. Histology:

1. Histology of mammalian Tissues and Organs –Epithelial, connective, blood, bone, cartilage, skin,stomach, intestine, liver, pancreas, kidney, testis and ovary.

X. Ecology:

1. Concepts of Ecosystem.
2. Biogeochemical cycles (Carbon, Nitrogen and Phosphorous).
3. Influence of environmental factors on animals, Energy flow in Ecosystem, Food chains, food web andtropic levels.
4. Animal Associations (Neutralism, Mutualism, Symbiosis, Commensalism, Parasitism, Predation andCompetition).
5. Ecological succession.
6. Environmental pollution- Air, water, land, noise, radioactive, thermal. Effects of pollution on ecosystem,Prevention of pollution
7. Wildlife in India- Conservation, Chipco movement.
8. Biodiversity- Economic significance, Conservation, Hot spots of India.

XI. Immunology:

1. Cells of the immune system- Lymphoid cells, Mono nuclear cells, Granulocytic cells, Mast cells.
2. Organs of the immune system- Primary and secondary lymphoid organs, Lymphatic system.
3. Antigens- Antigenic determinants or epitopes, immunogenicity, Haptens.
4. Humoral immunity -Iimmunoglobulin (fine structure of immunoglobulin and immunoglobulin classes),The complement system, Classical and alternate pathway, Inflammation.
5. Innate (Non-specific immunity) – Anatomical barriers, Phagocytosis, Natural killer cells (NK cells),Interferons.
6. Cell mediated immunity– Mechanism of cell mediated immunity, Brief account on Antigen presentation,Major Histocompatibility complex.
7. Antigen-Antibody interactions- Affinity, Avidity, Cross-reactivity, Precipitation reactions, Agglutinationreactions and ELISA.
8. Brief account on Immunological Hypersensitivity disorders:
    a) Tolerance and Autoimmunity
    b) Transplantation
    c) Immunodeficiency diseases – HIV.
    d) Immunization (Active and Passive immunity)

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9. Paper – II: Computer Science

1. **Computer Organization:** Memory Organizations, CPU Organisation, Assembly Language, Microprogramming, Input-Output Organization, Intel 8086 Computer.

2. **Programming:** Programming in C, Object oriented programming concepts including classes, Polymorphism, Inheritance, and Programming in C++, Java and Python.

3. **Data Structures:** Arrays, Records, Linked Lists, Trees, Binary Tree Traversal, Binary Search Trees, and Graphs.

4. **Design and Analysis of Algorithms:** Algorithm complexity, Algorithms Design Techniques – Divide and Conquer, Greedy Method, Dynamic Programming, Backtracking, Branch and Bound, NP-Hard and NP-Complete Problems.

5. **Principles of Programming Languages:** BNF, Variables, Data Types, Control Structures, Scope and Extent, Data Abstraction, Concurrency concepts, Exception Handling, Functional Programming, and Logic Programming.

6. **Compiler Design:** Types of grammar, Phases of compiler, Lexical Analysis, Parsing Techniques, Code generation and Optimization.

7. **Operating Systems:** Introduction, Process and CPU Scheduling, Process Synchronization, Deadlocks, Disk and Memory Management, Virtual Memory, File System Interface and Implementation, Protection and Security.

8. **Database Management Systems:** Introduction, Relational Model and Languages, Data Modeling, Database Design Theory and Methodology, SQL/ PLSQL, Transaction Processing & Concurrency control and Database Recovery & Security.

9. **Computer Graphics:** Line Drawing, Graphic Primitives and Polygons, 2D Transformations, Windows and Clipping, 3-D Graphics, Curves and Surfaces.

10. **Computer Networks:** Introduction, Seven Layers in OSI Model, Network Protocols, Internetworking, and TCP/IP Model.

11. **Distributed Operating Systems:** Goals, Client-Server Model, Synchronization in distributed systems, Distributed Process Management and File Systems, Distributed Shared Memory.

12. **Software Engineering:** Software Characteristics, Software Process Models, Analysis, Design, Coding, Testing, and Software Quality Assurance.

13. **Object oriented Analysis and Design:** Introduction to UML, Basic Structural Modeling, Classes and Object Diagrams, Behaviour Modeling and Architecture Modeling.

14. **Network Security:** Data Encryption and Decryption, Symmetric Key algorithms like DES, IDEA and AES, Public Key Cryptography, RSA algorithm, Digital Signatures & Authentication, Firewalls and VPN.

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10. Paper – II: Geology

1. Geomorphology & Field Geology: Fundamental concepts of geomorphology, Geomorphic processes, Weathering, soils, mass wasting, Streams and valleys, drainage patterns and their significance, groundwater, glacial cycle, wind, lakes, seas, earthquakes, volcanoes and mountains, application of geomorphology to various fields of earth sciences.

Field Geology: Toposheet, geological map, field work and sampling, compass, geological mapping procedures. Surveying Principles and methods surveying, chain survey, prismatic survey, plane table survey and theodolite survey. Dumpy's level.

2. Crystallography, Mineralogy& Optical Mineralogy: External symmetry of crystals: symmetry elements, classification of crystals into systems and classes, diffraction of crystals, Braggs' law. Physical properties of minerals, classification of minerals, structural and chemical principles of crystals / minerals, physical and optical characters and paragenesis of mineral groups- Olivine, pyroxene, amphibole, feldspars, quartz, chlorite, mica, spinel, epidote and garnet groups, optical properties of common rock forming silicate minerals.

3. Structural geology and Geotectonics: Stress-strain relationship of elastic, plastic and viscous materials. Principles of geological mapping, measurement of strike and dip, Structural analysis of folds, cleavages, lineation's, joints, and faults, superposed deformation, mechanism of folding and faulting, Unconformities, structural behavior of igneous rocks, diapirs and salt domes, fundamentals of petrofabric analysis.

Earth and solar system, planetary evolution of earth and its internal structure, Heterogeneity of the earth's crust, Major tectonic features of the oceanic and continentalcrust, Continental drift, mid oceanic ridges, deep sea trenches, continental shield areas and mountain chains. Paleomagnetism, seafloor spreading and plate tectonics, Island arcs, oceanic islands and volcanic arcs, isostacy, orogeny, geosynclines, and seismic belts of the earth, seismicity and plate movements, Geodynamics of the Indian plate.

4. Palaeontology & Stratigraphy: Micro-palaeontology, origin and evolution of life, classification and uses of micro fossils. Plant fossils: Gondwana flora and their significance, Invertebrate and vertebrate palaeontology, fossils and their morphology, distribution with geological time period.

Principles of Stratigraphy, geological time scale, modern methods of stratigraphic correlation, Precambrian Stratigraphy of India, Stratigraphy of the Palaeozoic, Mesozoic and Cenozoic formations of India. Gondwana system and Gondwana land, origin of Himalaya and evolution of Siwalik basin, Deccan traps, Quaternary Stratigraphy, rock record, paleoclimates and paleogeography.

5. Igneous Petrology & Geochemistry: Origin of magmas, phase equilibrium in igneous systems, Bowen's reaction principle, Magmatic evolution and differentiation, Structures and textures of igneous rocks, Classification of igneous rocks, Magmatism and tectonics, Igneous rock suites- Ultramafic rocks, Basic rocks, Intermediate rocks, Acidic rocks and Alkaline rocks.

Geochemistry, Elements, Meteorites, Primary geochemical differentiation of earth, Goldschmidt's geochemical classification of elements, Periodic table, Magmatism as geochemical process, Major elemental distribution in igneous rocks, Trace element distribution in igneous rocks, Sedimentation as a geochemical process, Metamorphism as a geochemical process, Isotope geochemistry, Atmospheric geochemistry.

6. Metamorphic Petrology & Thermodynamics: Metamorphism, factors and kinds of metamorphism and metamorphic processes; Classification of metamorphic rocks and

nomenclature, Structures and textures, zones, grades, and facies of metamorphism, Phase relations and phase diagrams for metamorphic mineral assemblages, processes and products of Contact, Regional, thermal, dynamo-thermal metamorphisms, metasomatism, granitization, typical Indian rocks.

Objectives of thermodynamics, inter-relationship between petrogenetic processes and thermodynamics, Role of thermodynamics in geochemistry, Phase rule, 'pressure-temperature-depth relations' among various metamorphic facies and ultra metamorphism, Paired metamorphic belts, Metapelitic and metabasic minerals and mineral assemblages, First law of thermodynamics, Second law of thermodynamics, P-T diagrams, geothermobarometry, pressure(P)-temperature(T)-time(t) paths.

7. Sedimentology & Petroleum Geology: Sedimentary environments- fluvial, glacial, eolin and lacustrine environments, transitional environments including deltaic, beach and tidal flats, marine environments including shelf (clastic and non-clastic) and deep sea sedimentary environment, Evolution of sedimentary basins, Tectonic setting of sedimentary basins.

Petroleum Geology, Constitution and Genesis of hydrocarbons, conversion of organic matter to petroleum, variety of petroleum hydrocarbons and gas hydrates, Reservoir rocks, Migration and accumulation of oil, structural traps, stratigraphic traps and combination traps, salt domes, methods of Exploration and exploitation of petroleum, Geographic and stratigraphic distribution of oil and gas, global distribution, petroliferous basins in India.

8. Ore Genesis, Mineral Deposits and Mineral economics: Modern concept of ore genesis, principal ore mineral groups, plate tectonics and ore deposits, ore textures, Paragenetic sequences and zoning in metallic ore deposits, ore microscopy, application of geothermobarometry, fluid inclusions in ores, Role and application of stable isotopes in ore genesis, Petrological ore associations with Indian examples, orthomagmatic ores of mafic-ultramafic association, diamonds in kimberlites, REE in carbonatites, chromite in chromitites and basic rocks, PGE in ultramafic and basic rocks, Chemical and clastic sedimentation, stratiform and stratabound ore deposits (Mn, Fe, non-ferrous ores), placer concentrations, Ores related to weathering and weathered surfaces, laterite, bauxite and manganese nodules.

Study of geology, nature of occurrence and the genesis of the following ore deposits with special reference to India- Iron, Chromite, Manganese, Copper, gold, Lead and Zinc, Bauxite, Magnesite, Barites, Mica, Asbestos, decorative stones, *Mineral based Industries:* Iron and steel; *Refractories:* Ceramic, electrical and insulators, glass.

Stragetic, critical and essential minerals. Indias status in mineral production. Change in pattern of mineral consumption, National Mineral Policy. Mineral concession rules, Marine mineral resources and law of sea, Conservation and substitution of minerals.

9. Environmental Geology: Concepts and principles, Natural hazards, preventive/precautionary measures-floods, landsides, earthquakes, rivers and coastal erosion. Impact assessment of anthropogenic activities such as urbanization, open-cast mining and quarrying, river-valley projects, disposal of industrial radioactive waste, excess withdrawal of groundwater, use of fertilizers, dumping of ores, mine waste and flyash, Organic and inorganic contamination of groundwater and their remedial measures, soil degradation and remedial method, Environmental protection-legislative measures in India, factors for groundwater subsidence.

10. Engineering Geology Mechanical properties of rocks and soils, Geological investigations for river-valley projects-dams and reservoirs, tunnels-types, methods and problems, Bridges-types and foundation problems, shoreline engineering, landslides-classification, causes, prevention and rehabilitation, Earthquake resistant structure, Problems of groundwater in engineering projects and Geotechnical case studies of major projects in India.

11. Mineral Exploration and Fuels: Methods of surface and subsurface exploration, prospecting for economic minerals and fuels-drilling, sampling, and assaying. Geophysical techniques – gravity, electrical, magnetic, air borne, and seismic surveys, Instrumental techniques of detection and measurement of radioactivity, Radioactive methods for

prospecting and assaying of mineral deposits. Geomorphological and remote sensing techniques, Geobotanical and geochemical methods. Bore hole logging and survey. Origin of coal, Stratigraphy of coal measures, Fundamentals of coal petrology, peat, lignite, bituminous and anthracite, Industrial application of coal, Indian coal deposits, Origin, accumulation, migration and entrapment of natural hydrocarbons, characters of reservoir rocks, structural, stratigraphic and mixed traps, geographical and geological distribution of petroliferous basins of India. Gas hydrates and Coal Bed Methane occurrences, Mineralogy and geochemistry of radioactive minerals, distribution of radioactive minerals in India, Radioactive methods in petroleum exploration-well loggingtechniques, nuclear waste disposal-geological constraints.

12. Hydrogeology: Origin of water, Hydrological cycle, water table, Rock properties affecting groundwater, Types of aquifers, Porosity, permeability, specific yield and retention, hydraulic conductivity, trasmitssivity, storage and storage coefficient. Water level fluctuation and causative factors, methods of pumping tests and analyses, evaluation of aquifer parameters, artificial recharge of groundwater, groundwater legislation, groundwater quality and groundwater pollution, arsenic and fluoride problems, quality criteria for groundwater use, salt water intrusion in coastal aquifers and remedial methods, surface geophysical methods-seismic, gravity, geoelectrical and magnetic, subsurface geophysical methods-well logging for delineation of aquifers and estimation of water quality, Watershed management.

13. Photo Geology, Remote Sensing, GIS and GPS: Elementary idea about photogeology: electro-magnetic spectrum, types & geometry of aerial photographs; factors affecting aerial photography; Fundamentals of remote sensing; remote sensing systems; remote sensing sensors; signatures of rocks, minerals and soils. Application of remote sensing in geosciences and geomorphological studies, Types of Indian and Foreign Remote Sensing Satellites, Digital image processing; fundamental steps in image processing; elements of pattern recognition and image classification, Geographic Information System (GIS), components of GIS; product generation in GIS; tools for map analysis; integration of GIS with remote sensing. Geographic positioning system (GPS), scope of GPS, advantages and uses of GPS in different fields.

14. Mining Geology: Alluvial, open- pit and underground mining methods; mine organization and operation; mine hazards. Sampling techniques, drilling methods, estimation of ore reserves, Cost of mining; future costs and profits; life of mine; present value of mine. Environmental issues with mining.

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11. Paper – II: Bio-Chemistry

I. Chemistry of Biomolecules: Classification, structure & characteristics of amino acids, carbohydrates andlipids. Classification and structural organization of proteins, polysaccharides and lipids. Biological role andimportance of polypeptides, lipids and polysaccharides. Structure of purines, pyramidines, nucleosides andnucleotides. Stability & formation of phosphodiester bond. Watson & Crick model, Different forms of DNA.DNA super coiling. Types of RNA. Structure of t-RNA. Denaturation & renaturation of DNA, Tm andhyperchromic effect. Chemical and enzymatic susceptibility of nucleic acids. Structure and properties vitamins,Metabolism of amino acids, lipids and nucleotides. Metabolic diseases.

II. DNA replication, transcription and translation. DNA polymerases of pro- and eukaryotes in DNA replication.Genetic code. Transcription in pro and eukaryotes and its regulation. Post transcriptional processing. Operonconcept. Ribosome structure. Proteinsynthesis. Inhibitors of transcription and translation.

III. Cell structure and organization:Cell structure and organization. ECM. Biomembranes structure and function.Transport across cell membranes. Mechanisms of Muscle contraction and nerve transmission.

IV. Enzymes: Nomenclature & classification of enzymes, cofactors and coenzymes. Enzyme kinetics. Factorsaffecting the rate of the reaction: Catalytic mechanisms of Lysozymes, RNAse, chymotypsin, trypsin, &carboxypeptidase. Law of thermodynamics, biological oxidation, High energy compounds. Electron transportchain. Photosynthesis.

V. Bioanalytical Techniques: Principles & applications of colorimetry & UV-Visible spectrophotometry.Fluorimetry, Principle and applications of ORD, CD, MS, AAS, Microscopy, Flowcytometry, electrophoresis,centrifugation. Application of isotopes in biochemical analysis. Counting radioactivity. Chromatographictechniques: Principles & applications of techniques based on partitioning, Ion-exchange andaffinitychromatography.

VI. Molecular methods: Polymerase chain reaction (PCR), Real-time PCR. Fluorescent in situ hybridization(FISH), RFLP, RAPD. DNA finger-printing, DNA microarrays. DNA sequencing. DNA probes. Blottingtechniques and their applications.

VII. Endocrinology & Physiology: Organization of the endocrine system. Classification and mechanism ofaction of hormones. Structure and organization of Muscle and nervous system. Clinical Biochemistry andNutrition: Abnormal electrolyte composition of blood in disease. Major cardiac, liver and thyroid diseases.Disorders of kidneys. Cardiac function tests, Liver function tests, Renal function tests, Gastric, pancreaticand intestinal function tests. Thyroid function tests.

VIII. Microbiology and Molecular Biology: Classification of bacteria, Gene transfer mechanisms in bacteria,Bacteriophages: Structure, composition and life cycle of bacteriophages. Viruses: General features, Cultivationof viruses in animals & tissue culture. Life cycles of animal viruses (SV-40, Adenovirus, Poliovirus,Retroviruses (RSV / HIV). Plant viruses -TMV. Gene organization and regulation in prokaryotes & eukaryotes.

IX. Genetic Engineering: Restriction endonucleases, Cloning and expression Vectors, overview of cloningmethods, Methods of isolation of DNA, ligation, introduction of rDNA, genomic and cDNA libraries,selection of clones. Fusion proteins. Expression of recombinant protein in bacteria, yeast and cultured animalcells.

X. Immunology: Components of immune system, Classification, structure & biological properties ofimmunoglobulin. Isotype, allotype and idiotypic variations. Theories of antibody formation, generation ofantibody diversity. Hurmoral & cell mediated immune response. Complement activation and types (alternate,classical, lectin pathways) and its regulation. Immune disorders, Type I, II, III and IV Hypersensitivity.Auto-immune diseases, ELISA,RIA and monoclonal antibodies.

XI. Bioinformatics: Introduction to Biological databases. Sequence based approach (Pair-wise alignment, multiplesequence alignments), SNPs in human diseases.

XII. Transcriptome, genomic comparison. Antisense Oligos. siRNA/RNAi in expression analysis. Proteomics:Protein sequencing methods, structure, modeling, Protein motif & domain prediction: phylogenetic comparison& analysis. Protein arrays LC-MS-MALDI analysis.

XIII. Cell Signaling and Cancer: Cell growth and Cell cycle, Cell cycle regulation and cancer. tumor promotersand tumor suppressors. Stem cells. Cell differentiation: Fibroblast and muscle cell differentiation. Growthfactors (EGF, NGF, IGF, PDGF, erythropoietin). Totipotency. Cell Signaling: Basic concepts of signaltransduction. Classification of different signaling molecules. G-proteins, Second messengers-. Signalingcascades & regulation of growth, proliferation. Inhibitors of cell signalling pathways & Apoptosis. Cancer:Tumor suppressors and tumor promoters. Discovery of oncogenes, proto-oncogenes. Modes of action ofoncogenes – G proteins. Stress signaling in plants (biotic), Stress signaling in plants (abiotic), Plants hormonesand their mechanism of action, Signaling in yeast, STAT pathway in yeast. animal cell culture andtheirapplications.

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12. Paper – II: Bio-Technology

I. **CELL BIOLOGY:** Diversity of cell size and shape. Cell theory, microscopic techniques for study of cells. Sub-cellular fractionation and criteria of functional integrity. Cellular organelles-Plasma membrane, cell wall, Mitochondria, Chloroplast, Nucleus and other organelles and their organization, structure and functions. Cell motility-cilla, flagella of eukaryotes. Transport of nutrients, ions and macromolecules across membranes. Liposomes, drug delivery systems, cellular energy transactions-role of mitochondria and chloroplast. Molecular assemblies like membranes; structure and functional aspects. Ribosome's, extra cellular matrix. Cell cycle – Overview of eukaryotic cell cycle, regulation of cell cycle by cell growth and extra cellular signals. Cell cycle check points. Regulators of cell cycle progression – MPF, cyclins and cyclin-dependent kinases. Cell death and proliferation – Apoptosis: definition, differences between apoptosis and necrosis and mechanism. Cancer: Types and Classification, Development and Properties of Cancer cells. Somatic mutations in cancer cells. Mechanisms of biotic (bacterial, fungal, insect) and abiotic (salt, drought and temperature) stress in plants. Signal transduction: types of receptors, second messengers (calcium, phoshoinositides, MAP kinase pathway, and Nitric oxide). Meiosis, Gametogenesis, fertilization and Development of chick embryo.

II. **BIOMOLECULES AND ANALYTICAL TECHNIQUES: -** Chemical foundations of Biology water, pH, pK, acids, bases, buffers, weak bonds, covalent bonds. Principles of hermody namics. Classification, structure and functions of carbohydrates, amino acids, proteins, nucleic acids and lipids. Chromatography Methods; partition, ion exchange, and affinity methods, criteria for purity, proteinsand nucleic acids sequencing methods, Hormones, vitamins and minerals. Analytical techniques: Principle, instrumentation and applications of VIS/UV, IR, NMR, LASER Raman Spectroscopy MASS Spectroscopy, Fluorescence Spectroscopy, Differential colorimetry, X-ray Crystallography, Ultra centrifugation, Electron Cryomicroscopy and Scanning Tunneling microscopy. Methods of cell study; confocal microscopy, Flowcytometry and FACS (fluorescence activated cellsorter) and atomic force microscopy. Radiochemical methods; Stable and radioactive isotopes, measurement of radioactivity by Liquid scintillation counting, Radio immune assay, GM counters and autoradiography, ELISA. Specific activity and precursor-product relationship. Tracer studies and Effect of radiation on cells.

III. **MOLECULAR BIOLOGY: -** DNA Structure, replication, repair and recombination, Transcripition, regulation and post transcriptional modifications in Prokaryotic and Eukaryotic genomes. Transcriptional and post-transcriptional gene silencing. Translation and regulation in Prokaryotes and eukaryotes, co-translation and post-translational modifications of proteins. Protein Localization-Synthesis of secretory and membrane proteins, import into nucleus, mitochondria, chloroplast and peroxisomes, Biology of Cancer-Oncogenes and Tumour Suppressor genes, Structure, function and mechanism of action of pRB and p53 tumor suppressor proteins. Antisense oligonucelotides, molecular targets of drug action and Ribozyme Technology. Homologous Recombination-Holliday model gene targeting, gene disruption, FLP/FRT and Cre/Lox recombination RecA and other recombinases. Molecular Mapping of Genome, Genes, mutation and mutagenesis, site directed mutagenesis and Human genome project, Transposons

IV. **BIOSTATISTICS: -** Frequency distribution, Distribution of data bionomial, poission and normal. Measures of central tendency-mean, median, mode and standard deviation-probability distribution-regression-correlation- Analysis of variance-tests of significance-T-test, F-test, Chi-square test.

BIOINFORMATICS-:-Biological databases, ORF finding, EST analysis, gene identification, microsatellite repeat patterns, BLAST, FASTA, Mutation matrix, global Vs local alignments, Dot plots, PAM and BLOSUM matrices, Multiple sequence modeling, alignments dendrograms, phylograms, protein structure prediction methods, molecular modeling, Primer design, QSAR, Drug designing.

V. **MICROBIOLOGY:** -Discovery of the microbial world; Distinguishing features of prokaryotic and eukaryotic genomes; general role of microorganisms in transformation of organic matter and in the causation of diseases; Microbial taxonomy; Classification, Nomenclature and new approaches to microbial taxonomy; Pure culture techniques; sterilization methods; Principles of microbial nutrition and composition of culture media; culture enrichment techniques; Growth and its mathematical expression; synchronized cultures, Culture collection and maintenance of cultures; Purple and green bacteria Ricketsias; Chlamydia and Mycoplasma. Archea; Viruses: structure and replication of viruses; DNA viruses and RNA viruses; Viroids and Prions; Viruse and their Genetic System; Bacteriophages; RNA phages; Retroviruses, Biomass and Bioenergy, Biofuels from microbes, biofertilizers and biopesticides.

VI. **GENETICS:-** Mendel's principles, applications of Mendel's principles, Chromosome Theory of Heredity (Sutton-Boveri), Inheritance patterns, phenomenon of Dominance, Inheritance patterns in Human (Sex-linked, Autosomal, Mitochondrial, Unifactorial, Multi-factorial). . Linkage & Crossing over - Chromosome theory of Linkage, kinds of linkage, linkage groups, types of Crossing over, mechanism of Meiotic Crossing over, kinds of Crossing over, theories about the mechanism of Crossing over, cytological detection of Crossing over, significance of Crossing over. Allelic Variation & Gene function – Multiple allele, Genetic interaction, Epiststic interactions, Non-Epistatic inter-allelic genetic interactions, Atavism/Reversion, Penetrance (complete & incomplete), Expressivity, Pleiotropism, Non-Mendelian inheritance – Evidences for Cytoplasmic factors, cytoplasmic inheritance, Epigenetics, extranuclear inheritance (mitochondrial, chloroplast), non- chromosomal inheritance, maternal inheritance, uniparental inheritance.

VII. **IMMUNOLOGY:**- Phylogeny of immune System;Innate and acquired immunity; Hematopoietic and differentiation, cells and organs of the immune system; Lymphocyte trafficking; Antigencity and super antigens; Immunoglobul in types, structure and function, Antigen-antibody interactions; Blood groups, Cellmigration and Homing, Immuno globulin and gene organization. Major histo compatibility complex, BCR and TCR and generation of diversity; Complement system, Antigen processing and presentation, generation of humeraland cell mediated immune responses; Activation of B-and T- lymphocytes,Cytokines and their role in immune regulation; Cell mediated cytotoxic,Hyper sensitivity, Auto immunity, Transplantation, Tumor Immunology, AIDS and other Immunode ficiency; Hybridoma Technology, Psychoneuro-immunology, Single chain antibodies, theories of antibody diversity, Vaccines – Concept of immunization, routes of vaccination. Types of vaccines – Whole organism (attenuated and inactivated) and component vaccines (synthetic peptides, DNA vaccines, recombinant vaccines, subunit vaccines, conjugate vaccines. Vaccinedelivery systems.

VIII. **BIOPROCESS ENGINEERING:-** Fermentation-types of fermentors and bioreactor design, cell concentration and stirring. Filtration, methods of cell disruption. Downstream processing, industrial applications of bioprocess. Synchronized and continuous culturing. Industrial production of glutamic acid, citric acid, ethanol, penicillin , lactic acid, α-amylase, protease,tetracycline, vitamin B12 and riboflavin. Purification and crystallization of products.

ENZYME TECHNOLOGY:- Discovery classifications and nomenclature of enzymes. Techniques of enzymes isolation and assay, Intracellular localization of enzymes, Isoenzymes, Multienzyme complexes and multifunctional enzymes Physico-chemical characterization of enzymes, Enzymes kinetics, kinetics of enzymes of inhibition. Allosterism, Enzyme memory, Various techniques used for the immobilization of enzymes and their applications in Biotechnology. Purification of enzymes and their applications, Single cell proteins. Industrial application of enzyme, applications in biosensors.

IX. **ENVIRONMENTAL BIOTECHNOLOGY:-** Ecological balance, resiliency of ecosystem and sustainable development, environmental pollution and global problems, water, air, soil pollution and their impacts on environment. Biotechnological approaches for management of pollution, waste water treatment: aerobic and anaerobic processes, bioremediation of contaminated soils and waste land, biotechnological treatment for industrial effluents and solid wastes. GEMS (Genetically Engineered micro organisms) for bioremediation.

X. **GENETIC ENGINEERING:-** Discovery, properties and application of Restriction enzymes, Cloning and expression vectors, Purification of plasmids, genomic DNA and mRNA. Genomic and cDNA Library construction and screening of recombinants by hybridization methods, Reporter assays, protein engineering- site directed mutagenesis, adding disulfide bonds – changing asparagines to other amino acids modification of metal cofactor requirements. Increasing of specific activity Stability to thermal and salinity conditions, Phage Display library and yeast two hybrid system. Gene transfer methods, gene tagging, Role of gene tagging analysis; Gene Therapy, Gene silencing methods (RNA interference), Biochips and functional genomics.

XI. **PLANT BIOTECHNOLOGY:-** Selection of explants, micropropagation techniques in plant tissue culture suspension culture, single cell. Anther, pollen and ovary culture for production of haploid plants. Cryopreservation for germplasm conservation. Plant Transformation technology, Transgene stability and gene silencing. Application of plant Transformation for productivity and performance. Metabolic Engineering and Industrial products: Plant secondary metabolites, industrial enzymes, biodegradable plastics, therapeutic proteins, antibodies, edible vaccines. Molecular marker assisted selection and Breeding: RFLP maps, SSR markers, STS, microsatellites, SCAR (sequence characterized amplified regions), SSCP (single stand conformational polymorphism), AFLP, GM Crops

XII. **ANIMAL BIOTECHNOLOGY: -** Animal cell culture technology, simple and complex growth media, cell culture techniques, primary and established cell lines. Biology and characterization of the cultured cells, measuring growth parameters, maintenance of cell culture, Measurement of viability and cytotoxicity, cell separation. Scaling–up of animal cell culture. Cell synchronization. Cell cloning and micromanipulation. Cell transformation. Stem cell cultures, embryonic stem cells and their applications. Cell culture based vaccines. Organ and histotypic cultures. Apoptosis, measurement of cell death. Biodegradation of Toxicants, Diagnostic aids, organ perfusion studies,Embryo transfer, stem cell biology, GM animals. Principles and preparation of DNA and RNA probes and their applications: Study and expression of cloned genes in prokaryotes and eukaryotic systems. Microbial production of interferon, human growth hormone, insulin in *E.coli*. Genetic Engineering – Social, ethical and moral implications, national and international guidelines/regulations. Biotechnology patents and safeguarding human and animalhealth.

Written Examination Syllabus for the post of Degree College Lecturers in Residential Educational Institutions Societies

13. Paper – II: History

I. Ancient India:

1. History; Definition, Scope, Nature, Sources and Methods.
2. Pre and Proto History – Stone ages and Chalcolithic Cultures.
3. Harappan Civilization – Characteristic features, Major cities – socio-economic conditions, HarappanScript, Religious practices –Decline.
4. Iron Age –Aryan Migrations – Second Urbanization.
5. India in 6th Century BC; Early States, Sixteen Mahajanapadas, Rise and Growth of Magadha – Society,Economy – Jainism, Buddhism, Ajivikas and Lokayatas.
6. Mouryan Age: Chandragupta Mourya and Ashoka, Mouryan Polity, Administration, Dhamma, Socio-Economic conditions – Decline.
7. Pre Satavahanas: Sangam Age and Satavahana Age; Political history, Administration, Society, Economyand Culture- Post Satavahana period – Chedi (Kharavela) Ikshvakus, Vakatakas, Abiras, Kshatrapasand Vishnukundis, Kushans (Kanishka).
8. Gupta Age: Political History, Administration, Socio-Economic conditions, Growth of Culture, Art andArchitecture, Literature – Decline.
9. India in the Seventh Century A.D.; Pushyabhutis (Harsha), Pallavas, Chalukyas and Rashtrakutas –Political History, Society, Economy and Culture.

II. Medieval India:

10. India between 650 A.D. to 1200 A.D.- Rajputs, Arab and Turkish Invasions - Later Pallavas, Chalukyas,Chola Art, Architecture and Chola Administration – Society, Economy and Culture.
11. Age of Delhi Sultanate1206 A.D. -1526 A.D. – Political History, Administrative System, Changes inSociety and Economy- Bhakti and Sufi Movements
12. Age of Vijayanagara - Origin, Political History, Krishnadevaraya, Socio and Economic conditions,Culture, Art, Architecture, Decline – Bahamanis.
13. Moghul Age (1526-1707) – Political History, She Shah, Akbar, Administration, Society, Economy,Culture- Decline – Marathas and Shivaji.

III. Modern India

14. Establishment of British Power in India –Early resistance – Hyder Ali, Tippu Sultan.
15. British paramountcy in India-Policies of Governor Generals, Impact of British policy on IndianAgriculture and Economy.
16. Socio – Religious Reforms Movements –Brahmo Samaj –Arya Samaj, Satyashodhak Samaj and others– Educational policies of the British and their Impact.
17. 1857 Revolt; Causes Results and Significance.
18. 18. Rise and Growth of Indian National Movement –Nationalist Movement I Phase from 1885 A.D. -1905A.D. – Indian National Congress; Moderates, Extremists and Early Revolutionaries II phase at 1905-1920 – Vande Mataram Movement Home Rule - Role of Tilak and Anie Beasant- Later phase ofRevolutionary Movement. III Phase 1920-1947 - Non Co-operation Movement, Emergence of Gandhi,Civil Disobedience, Salt Satyagraha, Quit India Movement- Subhash Chandra Bose – ConstitutionalReforms- Dr.B.R.Ambedkar - Declaration of Independence – Role of Women in Indian NationalMovement.

IV. Modern World:

19. Industrial Revolution- Significance and Results.
20. American War of Independence – Causes, Results, Significance.
21. French Revolution – Causes, Effects, Significance.
22. National Liberation Movements in Italy and Germany in the 19th Century – Mazzini, Cavour, Garibaldi,Bismarck.
23. World War-I – Causes and Effects – League of Nations.

24. The Russian Revolution of 1917 – Causes, Results and Significance.
25. The world between the Two World Wars – Nazism in Germany, Fascism in Italy, Turkey under MustafaKamal Pasha.
26. Developments in China 1911-1949 – Nationalist Revolution of 1911 – Communist Revolution of1948 – Japan under Meiji Era –Vietnam Revolution.
27. World War-II – Causes and Effects – United Nations Organisation.

V. History of Telangana

28. Pre History
29. Pre Satavahana, Satavahana, Post Satavahana - Ikshvakus, Vakatakas, Abiras and Vishnukundis.
30. Telangana from 7th Century to 11th Century- Chalukyas of Badami, Vemulavada, Mudigondi andKalyana.
31. Age of Kakatiya's; Origin, Political History, Administration, Socio Economic, Religious conditions,Art and Architecture and Literature and their Subordinates.
32. Padma Nayaka's and Musunoori.
33. Qutubshahis – Administration, Religion, Art, Architecture and Literature.
34. Asafjahis – Administration, Economy, Culture and Society, British Paramountcy on Hyderabad State.
35. Freedom Movement in Telangana, Telangana Armed Struggle.

Written Examination Syllabus for the post of Degree College Lecturers in Residential Educational Institutions Societies

14. Paper – II: Economics

I . Micro Economics

1. Demand Analysis

Definitions, Nature and Scope of Economics – Micro and Macro Economic Analyses – Concepts of Demandand Law of Demand – Determinants and Types of Demand – Demand Function – Shifts in Demand –Concepts of Supply and Law of Supply – Market Equilibrium – Elasticity of Demand: Concept and Types– Price, Income and Cross Elasticities of Demand – Measurement Methods of Price Elasticity of Demand

2. Utility Analysis

Cardinal and Ordinal Utility Approaches – Law of Diminishing Marginal Utility – Law of Equi-MarginalUtility – Consumer Surplus – Indifference Curve Analysis: Assumptions, Properties, Budget Line andConsumer's Equilibrium – Derivation of Demand Curve with the help of Indifference Curves – Price,Income and Substitution Effects – Hicks and Slutsky Versions – Revealed Preference Theory

3. Production Analysis

Production, Production Function and Factors of Production – Law of Variable Proportions – Isoquant, IsocostCurves and Producer's Equilibrium – Laws of Returns to Scale – Economies and Diseconomies of Scale –Cost Analysis: Cost Curves in Short Run and Long Run – Revenue Analysis – Relationship among AverageRevenue, Marginal Revenue and Elasticity of Demand

4. Market Structure Analysis

Concepts of Firm, Industry and Market – Classification of Markets – Objectives of the Firm – Equilibriumof a Firm – Shut-Down Point – Perfect Competition: Concept, Characteristics, Equilibrium of Firm andIndustry – Optimum Firm – Monopoly: Concept, Types, Characteristics and Equilibrium of the Firm – PriceDiscrimination – Bilateral Monopoly – Monopolistic Competition: Concept, Characteristics, Equilibrium

of the Firm and Selling Costs

5. Oligopoly, Duopoly and Factor Pricing Analysis

Oligopoly: Concept, Characteristics and Price Rigidity – Oligopoly Models – Duopoly: Concept andCharacteristics – Duopoly Models – Marginal Productivity Theory of Distribution – Distribution Theoriesof Rent, Wages, Profit and Interest

II . Macro Economics

1. National Income Analysis

Concept, Nature & Scope and Importance of Macro Economics – Concept of Circular Flow of Incomes– National Income Analysis: Concepts and Components – Methods of Measurement of National Income– Importance of and Difficulties in the Estimation of National Income – Limitations of National Incomeas a Measure of Welfare – Social Accounting

2. Theories of Income and Employment

Classical Theory of Employment: Say's Law of Markets and Pigou's Wage Cut Policy – KeynesianTheory of Income and Employment: Effective Demand, Aggregate Demand Function and AggregateSupply Function – Consumption Function: Average Propensity to Consume and Marginal Propensityof Consume – Factors Determining Consumption Function – Savings Function: Average Propensity toSave and Marginal Propensity to Save – Concepts of Multiplier, Accelerator and Super-Multiplier

3. Theories of Investment and Interest Rate

Capital and Investment – Types and Determinants of Investment – Marginal Efficiency of Capital –Ex-Post and Ex- Ante Investment and Savings – Classical, Neo-Classical and Keynesian

Theories ofInterest – Simultaneous Determination of Interest and Real Income through IS-LM Framework

4. Supply of Money and Demand for Money

Meaning, Functions and Classification of Money – Measures of Money Supply – Demand for Money– Classical Theories of Money: Fisher's and Cambridge Versions of Quantity Theory of Money –Keynesian, Baumol and Milton Friedman Approaches to Demand for Money

5. Inflation and Trade Cycles

Inflation: Concept and Types – Causes and Measurements of Inflation – Effects (Consequences) ofInflation – Measures to Control Inflation – Phillips Curve, Deflation and Stagflation – Trade Cycles:Concept, Nature and Causes – Phases and Remedial Measures of Trade Cycles – Models of BusinessCycles : Samuelson, Hicks and Kaldor

III . Public Finance

1. Introduction to Public Finance

Role of State in Economic Activities, Planning and Development – Nature, Scope and Evolution ofPublic Finance – Public, Private and Merit Goods – Multiple Theory of Public Household – Principleof Maximum Social Advantage

2. Public Revenue and Taxation

Public Revenue: Sources and Classification – Direct and Indirect Taxes – Progressive, Proportionaland Regressive Taxes – Canons of Taxation – Characteristics of a Good Tax System – Impact andIncidence of Taxation – Effects of Taxation – Approaches to Taxation

3. Public Expenditure and Public Debt

Public Expenditure: Classification and Principles – Determinants of Public Expenditure – Theories ofPublic Expenditure: Wagner and Peacock-Wiseman – Effects of Public Expenditure – Public Debt:Nature, Sources and Classification – Effects and Redemption of Public Debt – Debt Trap

4. Fiscal Policy and Federal Finance

Fiscal Policy: Concept, Objectives and Tools – Fiscal Policy and Monetary Policy – Federal Finance: Concept and Features – Centre-State Financial Relations – Transfer of Resources from Centre toState and Local Bodies – Functions of Finance Board – Current Finance Board'sRecommendations

5. Budget

Budget: Concepts, Classification and Types – Revenue Account and Capital Account –Budget Deficits:Concepts, Types and Implications – Fiscal Responsibility and Budget Management (FRBM) – Budgetingin India

IV. International Economics

1. Theories of International Trade

International Trade and Inter-Regional Trade – Inter-Industry Trade – Gains from Trade – Trade as anEngine of Economic Growth – Role of International Trade in Economic Development – Classical andNeo-Classical Theories of International Trade – Theory of Factor Price Equalisation – Heckscher-Ohlin Theory of International Trade

2. Terms of Trade and Barriers to Trade

Concepts of Terms of Trade – Factors Affecting Terms of Trade – Uses and Limitations of Terms ofTrade – Secular Deterioration Hypothesis of Terms of Trade: Singer and Prebish – Gunnar MyrdalViews on Terms of Trade – Tariffs, Quotas and Subsidies: Their Effects – Impact of Tariffs on Partialand General Equilibrium Analyses – Political Economy of Non-Tariff Barriers and Their Implication

3. Balance of Payments

Concepts of Balance of Trade and Balance of Payments – Factors Affecting Balance of Trade – Differences Between Balance of Trade and Balance of Payments – Components of Balance of

Payments– Equilibrium and Disequilibrium in Balance of Payments – Types of Disequilibrium – Causes andConsequences of Disequilibrium in Balance of Payments – Remedial Measures for CorrectingDisequilibrium in Balance of Payments – Devaluation – Recent Trends in India's Balance of Payments

4. Exchange Rates

Foreign Exchange Market – Exchange Rates: Concept and Types – Relative Merits and Demerits ofFixed and Flexible Exchange Rates – Theories of Exchange Rates Determination: Mint Parity andPurchasing Power Parity (PPP) – An Overview of Different Methods of Exchange Rate Determinationin India

5. International Monetary System and International Finance

International Liquidity – Lending Operations of International Financial Institutions: IMF, World Bank(IBRD), IDA, IFC, ADB and BRICS – Euro-Dollar and Euro-Currency Markets – International TradeInstitutions: GATT and WTO – Impact of WTO on Indian Economy

V. Economics Of Development And Growth

1. Socio-Economic and Institutional Aspects of Economic Development

Concepts of Economic Growth, Development, Underdevelopment and Deprivation – DistinctionBetween Growth and Development – Objectives of Economic Development – Sustainable Developmentand Inclusive Growth – Indicators (Measures) of Economic Development

2. Factors of Economic Development

Factors Hindering Economic Development – Factors Promoting Economic Development – Populationand Economic Development – Population Explosion – Theories of Demographic Transition – MalthusianPopulation Theory – Optimum Theory of Population – Human Resource Development and EconomicDevelopment- --Natural Resources and Economic Development – International Aspects of EconomicDevelopment

3. Theories of Growth and Development

Classical Theories of Economic Growth: Adam Smith, Ricardo and J. S. Mill – Karl Marx Theory ofEconomic Development – Schumpeter's Theory of Economic Development – Rostow's Theory ofEconomic Growth – Hansen's Theory of Secular Stagnation

4. Strategies of Economic Development and Growth

Big Push Theory – Balanced Growth Strategies of Rodan, Nurkse and Lewis – Unbalanced GrowthStrategy of Hirschman – Critical Minimum Effort Thesis – Low Level Equilibrium Trap – Theories ofSocial and Technological Dualism

5. Growth Models

Harrod-Domar Growth Model – Kaldor's Growth Model – Joan Robinson's Growth Model – GunnarMyrdal's Model – Choice of Techniques: AK Sen – Technical Progress: Hicks and Harrod

VI. Indian Economy

1. Basic Structure and Demographic Features of Indian Economy

Basic Features of Indian Economy: Growth, Trends and Structural Changes in Indian Economy – Demographic Features of Indian Population – Size, Growth and Composition of Population and TheirImplications on Indian Economy – Concepts of Demographic Transition and Demographic Dividend– Secoral and Occupational Distribution of Population in India – Population Policy of India – HumanResource Development: Education and Health – Human Development Index

2. National Income, Income Inequalities, Poverty and Unemployment

Estimation of National Income in India – Trends and Composition of National Income in India – Income Inequalities in India: Magnitude, Causes, Consequences and Remedial Measures – Poverty inIndia: Concept, Types, Trends, Causes and Consequences – Unemployment in India: Concept, Types,Trends, Causes and Consequences – Poverty Alleviation and Employment Generation Programmes inIndia.

3. Planning and Public Policy

Concept, Types and Importance of Planning – Major Objectives of Five Year Plans in India – Reviewof Five Year Plans : Achievements and Failures – Current Five Year Plan – NITI Aayog – EconomicReforms: Liberalisation, Privatisation and Globalisation – A Critical Evaluation of Economic Reforms– Regional Imbalances: Causes, Consequences and Remedial Measures – Rural-Urban Disparities:Migration

4. Agricultural Sector

Nature and Importance of Agriculture in Indian Economic Development – Trends in AgriculturalProduction and Productivity – Agricultural System in India and Land Reforms – Green Revolution –Cropping Pattern – Agricultural Finance – Agricultural Marketing – Agricultural Pricing – Food Securityin India

5. Industrial and Service Sectors

Structure, Growth, Trends and Importance of Indian Industry – Problems of Indian Industry – Medium,Small Scale and Micro Enterprises (MSME) : Growth, Role and Problems (Including Sickness Problem)– Industrial Policies of 1948, 1956 and 1991 – FEMA and Competition Board of India –Disinvestment Policy – Foreign Direct Investment – Concept and Components of Service Sector –Infrastructural Development: Transport, Energy, Communication and Information Technology

VII . Telangana Economy

1. Telangana Economy: Human Resources

Economic History of Telangana – Economic Features of Telangana – Demographic Features ofTelangana – Occupational Distribution of Population in Telangana – Sectoral Distribution of Population– Migration – Human Resource Development: Education and Health

2. Gross State Domestic Product, Poverty and Unemployment

Growth and Trends in Gross State Domestic Product and Per Capita Income in Telangana: DistrictwiseAnalysis – Sectoral Contribution to Gross State Domestic Product – Inequalities in the Distributionof Income and Wealth – Poverty in Telangana: Trends, Causes and Consequences – Unemployment inTelangana: Trends, Causes and Consequences – Poverty Alleviation and Employment GenerationProgrammes in Telangana – Other Welfare Programmes in Telangana

3. Agricultural Sector

Growth of Agriculture in Telangana Economy – Trends in Agricultural Production and Productivity –Determinants of Agricultural Productivity – Cropping Pattern – Agrarian Structure and Land Reforms– Irrigation: Sources and Trends – Mission Kakatiya – Agricultural Credit and Rural Indebtedness –Agricultural Marketing – Food Security in Telangana

4. Industrial Sector

Structure of Telangana Industry – Growth and Pattern of Industrial Development in Telangana –Industrial Policy of Telangana State – Special Economic Zones (SEZ) – Role of Small Scale Industriesin Telangana Economy – Problems & Remedial Measures of Small Scale Industries: Issue of Sickness– Industrial Finance in Telangana

5. Service and Infrastructural Sectors

Growth and Trends in Tertiary Sector in Telangana – Growth and Pattern of Development of ServiceSector in Telangana – Infrastructural Development in Telangana: Transport, Energy, Communication& Information Technology and Tourism – Regional Imbalances: Causes, Consequences & Remedial Measures

VIII. Quantitative Methods For Economic Analysis

1. Mathematical Foundations of Economic Analysis

Need and Importance of Quantitative Methods in Economics – Meaning and Basic Concepts of Mathematics: Constants and Variables – Functions: Linear, Non-Linear Functions – Equations andGraphs of Linear, Quadratic and Cubic Functions – Concept of Derivative -- Rules of Differentiationwith respect to Cost, Revenue, Price and Demand Functions –Application of Maxima and Minima inEconomic Analysis

2. Introduction to Statistics

Meaning, Basic Concepts and Uses of Statistics – Population and Sample – Frequency Distribution,Cumulative Frequency – Graphic and Diagrammatic Representation of Data – Types of Data: Primaryand Secondary Data – Methods of Collecting Data: Census and Sampling Methods (Random andNon-Random Sampling Methods)

3. Measures of Central Tendency and Dispersion

Measures of Central Tendency: Mean, Median, Mode, Geometric Mean and Harmonic Mean – Properties of Good Average – Comparison of Different Averages – Measures of Dispersion – Absoluteand Relative Measures of Dispersion: Range, Quartile Deviation, Mean Deviation, Standard Deviation,Coefficient of Variation and Variance

4. Correlation and Regression

Correlation: Meaning and Types – Karl Pearson's Correlation Co-efficient – Spearmen’s RankCorrelation – Regression: Meaning and Uses of Regression – Estimation and Interpretation ofRegression Line

5. Index Numbers and Time Series Analysis

Index Numbers: Meaning and Uses – Types of Index Numbers – Methods of Index Numbers: Laspayer,Paasche and Fisher – Analysis of Time-Series: Meaning and Uses – Components of Time SeriesAnalysis: Secular, Seasonal, Cyclical and Irregular Variations – Methods of Measurement of SecularTrends: Graphic, Semi-Averages, Moving Averages and Least Squares Methods

IX . Banking And Economics Of Infrastructure

1. Commercial and Central Banking

Commercial Banks: Concept and Types – Functions and Principles of Commercial Banks – BalanceSheet of Commercial Banks – Process of Credit Creation – Social Responsibility, Importance andGrowth of Commercial Banks in India – Central Banking – Functions of Reserve Bank of India –Concept and Objectives of the Monetary Policy – Instruments of Monetary Policy – Financial SectorReforms in India

2. Financial and Investment Banking

Concept, Types, Functions and Growth of Non-Banking Financial Intermediaries – Their Impact onIndian Economy – Measures Taken to Control Their Operations – Development Bank: Concept,Functions and Importance – Functioning of Different Development Banks – Investment Banking –Merchant Banking

3. Money Market and Capital Market (Financial Markets)

Money Market: Concept and Characteristics – Components and Sub-Markets of Money Market – Functions of Money Market – Recent Trends and Importance of Money Market in India – CapitalMarket: Concept, Functions and Importance – Components of Capital Market: Primary and SecondaryMarkets – Stock Exchange: Concept and Functions – SEBI and Its Functions

4. Infrastructure and Economic Development

Concept of Infrastructure – Infrastructure as a Public Good – Special Characteristics of Public Utilities– Importance of Infrastructure in Economic Development – Trends in the Growth of Infrastructure inIndia – Classification of Infrastructure: Social and Physical Infrastructure – Social Infrastructure:Education, Health and Hygiene – Human Resource Development: Concept, Scope and Importance –Education in India: Planning, Policies and Financing – Trends in the Growth of Education in India –Health in India: Planning, Programmes and Importance

5. Physical Infrastructure

Types of Physical Infrastructure – Concept of Energy – Sources of Energy: Renewable & Non-Renewable and Conventional & Non-Conventional Energy – Sources of Commercial Energy: Coal,Oil & Gas and Electric Power – Transport – Modes / Categories of Transport: Roadways, Railways,Airways and Waterways – Role of Transportation in Economic Development – Information andCommunication Technology (ICT): Concept, Growth, Trends and Importance

X . Economics Of Environment

1. Introduction to Environmental Economics

Concepts of Ecology and Environment – Interaction Among Ecology, Environment and Economy –Micro Economic Theory of Environment – The Pricing of the Environ-mental Variables – ParetoOptimality and Market Failure in the Presence of Externalities – Bio-Diversity: Meaning, Uses, Effectsand Conservation

2. Resource Allocation

Natural Resources: Meaning, Features, Classification and Importance – Economics of Exhaustible,Non-Exhaustible Resources – Problems of Resource Allocation – Natural Resources Depletion:Optimal Rate of Depletion – Common Property Resources: Problems – Conservation of Resources –Implications of Ecological Imbalances

3. Environmental Valuation

Valuation of Non-Market Goods and Services: Measurement Methods – Environmental Degradation:Concept and Causes – Valuation of Environmental Degradation – Direct and Indirect Methods –Degradation of Land (Soil), Forest and Natural Resources: Causes and Effects – Cost-Benefit Analysisof Environmental Policies and Regulations

4. Sustainable Development

Impact of Environment on GNP – Limits to Growth – Sustainable Development: Concept and Rules –Modern and Neo-Classical Views on Sustainable Development – Peoples Movement for SustainableDevelopment – Development vs Sustainable Development

5. Environmental Pollution and Policies

Environment and Economy Interaction – Industrial and Agricultural Technology: Its Impact onEnvironment – Different Types of Pollution: Their Causes and Effects – Environmetal Policy andConservation and Protection of Eco-System – Implementation of Environmental Policies in India –Global Environmental Issues.

Written Examination Syllabus for the post of Degree College Lecturers in Residential Educational Institutions Societies

15. Paper – II: Political Science

I. Political Science – Basic Concepts

- Political Science: Nature and Scope – Inter disciplinary Character.
- Key Concepts: State, Sovereignty, Power, Nation.
- Political Ideas: Rights, Liberty, Equality, Law and Justice.
- Democracy: Meaning and Theories and Democracy, Electoral System.
- Forms of Government: Unitary and Federal, Parliamentary and Presidential.

II. Political Theory

- Political Ideologies: Liberalism, Neoliberalism, Marxism, Socialism and Fascism.
- Role of Ideology and end of Ideology.
- Nationalism and Internationalism.
- Theories of Development: Marxian, Liberal and Gandhian

III. Political Thought

- Greek Political Thought: Plato and Aristotle.
- Medieval Political Thought: Aquinas and St. Augustine.
- Modern Political Thought: Machiavelli and Bodin.
- Contractual Political Thought: Hobbes, Locke and Rousseau
- Indian Political Thought: Manu, Kautilya, Buddha, Gandhi, Phule and Ambedkar

IV. Comparative Politics

- Comparative Politics: Nature, Scope and Approaches.
- Constitutionalism: Western and Non- Western.
- Organs of Government: Legislature, Executive and Judiciary.
- Party Systems and Pressure Groups
- Power, Authority and legitimacy.

V. Political Sociology

- Political Socialization and Political Culture
- Political Development and Political Modernization.
- Political Elite and Theories.
- Political Communication: Changing Role of Media.
- Political Stratification: Caste, Class and Gender.

VI. Indian Government and Politics

- Nationalist Movement and Making of the Constitution.
- Salient Features and Ideological foundations of Indian Constitution.
- Federalism and Centre - State Relations.
- Development Strategies in India: Planning
- Union Executive, Legislature and Judiciary: President, Prime Minister,^/ Council of Ministers, LokSabha and Rajya Sabha, Supreme Court and Judicial Review
- Contemporary Socio- Political Movements: Peasant, Dalit, Tribal Backward, Environmental,Regional and Sub: Regional Movements. Statehood Movements

VII. State and Local Governments

- Frame work for the study of State Politics.
- State Executive & Legislature: Governor, Chief Minister and State Legislature

- Panchayati Raj: Genesis and Development - Structure and Functions, 73rd Amendment of IndianConstitution
- Urban Local Government: Structure and functions, 74th Amendment of Indian Constitution

VIII. Public Policy and Political Analysis

- Public Policy: Nature, Scope and Importance - Public Policy as a Policy Science.
- Theories of Public Policy: Group theory, Incrementalism, Elite theory, Decision-making theory.
- Policy making Institutions: Legislature, Executive and Judiciary - Planning Board
- Policy Process: Role of Media, Political Parties and Pressure Groups.
- Policy Evaluation.

IX. International Relations

- Approaches to the study of International Relations.
- Colonization and Decolonization: Rise of Third world, Problems & Prospects
- Elements of National Power.
- International Security: Disarmament, Arms control, Diplomacy, Cold War, war and Conflict Resolution.
- International Organization

A. UNO: Aims, objectives, structure and its changing role in the contemporary world.

B. SAARC, ASEAN and EU

- Indian Foreign Policy: Non-Alignment, Relations with neighbors and security concerns andGlobalization.
- Contemporary issues in International Relations: Human Rights, Environmental Issues, climate Changeand Terrorism
- International Financial Institutional: World Bank, IMG & WTO.

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16. Paper – II: Commerce

I. Financial Management: Meaning, Nature, Objectives and Scope of Financial Management – CapitalBudgeting, Process, Techniques – Sources of Finance, Cost of Capital – Cost of various sources of finance– Leverages: Operating and Financial leverages - Capital Structure Theories – Dividend decisions – WorkingCapital Management – Cash, Receivables and Inventory Management.

II. Financial and Management Accounting: Accounting Standards - Corporate Reporting – Accounting forprice level changes – Human Resource Accounting – Responsibility Accounting – Analysis of FinancialStatements – Techniques: Comparative and Common Size statements, Trend analysis, Ratio analysis, FundsFlow and Cash Flow analysis – Marginal Costing and Decision Making.

III. Cost Accounting and Control: Cost concepts and Classification – Installation of costing system – Elementsof Cost: Material, Labour and Overheads – Methods of Costing – Techniques of costing: CVP, StandardCosting and Budgetary control – Uniform costing - Inter-firm comparisons and Activity Based costing –Cost Control, Cost Reduction and Cost Audit.

IV. Managerial Economics: Meaning, Nature and Scope of Managerial Economics – Demand Analysis, Productionand Cost Analysis- Market Structure: Perfect and Imperfect Markets.

V. Organisation Theory and Behaviour: Organisation concept and theories – Individual vs. Group Behaviour –Motivation and Morale – Communication: Types and Barriers – Leadership: Styles and Theories.

VI. Marketing Management: Meaning, Concepts, Nature and Scope – Marketing Environment – ConsumerBehaviour and Market Segmentation – Product, Price, Promotion and Channel management.

VII. Human Resource Management: HR Functions – HR Planning – Job analysis – Recruitment and JobEvaluation – Training and Development methods – Performance Appraisal Methods – Trade Unions andCollective Bargaining.

VIII. Business Environment: Meaning and Components of Business Environment – Industrial Policies (includingTelangana State Industrial Policy) – Liberalisation, Privatisation and Globalisation – Indian Capital andMarkets – Foreign Direct Investment - FEMA and WTO.

IX. Quantitative Techniques: Correlation and Regression – Sampling and Sampling methods – Probability andProbability Distributions – Hypothesis Testing – Parametric Tests (Z, t-test and ANOVA) and Non-parametricTests (Chi-square test).

X. IT and e-Commerce: e-Commerce business models – Internet and web technologies – e-payment methods, e-cash, e-cheques, credit cards, smart cards and debit cards.

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17. Paper – II: Journalism

Communication and Journalism

(Syllabus for the Post of **Journalism)**

Unit-I Communication concepts, models and theories

Communication concepts, theories (-effects, attitude, critical, cultivation, Marxist, normative, agenda setting, framing, diffusion of innovations, uses and gratifications,etc). Communication models .Semeiotics.

Unit-II History of Media

Historical understanding of media in the world. Origin growth and present status of press, film, radio, television and new media in India.Origin, growth and present status of media in Telangana. Contribution of prominent social reformers, freedom fighters and journalists to growth of press in India. Reports of various committees and commissions on communication/media related issues and their impact.

Unit-III Reporting

Journalism- basic concepts and terms. Concept of news. editing techniques and practices, Typography, principles of design, headlines, photo editing,basics of photo journalism, printing processes, trends in newspapers and magazines, readership surveys, ownership patterns, media and various social, political and cultural movements. Reporting: Agriculture, poverty, health, environment, science & technology, defence, industry.

Unit-IV International Communication:

History of international communication. NWICO debate. MacBride Commission Report. International Communication in the context of globalization and cultural imperialism. International Communication Organizations, intercultural communication.

Unit-V Broadcasting systems

Public service broadcasting, growth of private TV and radio channels, trends, policy issues, regulatory mechanisms, globalization, cultural issues, development issues, and gender issues, ethical and political issues. Broadcasting vs. Narrowcasting, News Broadcasters Association.

Unit-VI Communication Research

Types of research, steps in research process, Communication research methodology- proposal writing, content analysis, semeiotics, survey, sampling techniques, qualitative methods, case study, experimental research, ratings research; formative, process and summative research, statistical analysis including various tests and report writing. Online research. Research in different areas of communication-print, broadcasting, advertising, PR, and ICTs

Unit-VII Development Communication

Trends in development communication, experiences and case studies at national and international level, Theories and models of development communication, human development, development indices, sustainable development, traditional folk media, community radio, role of NGOs in development and health communication.

Unit-VIII New Media Technologies.

New media technologies and their impact on various fields in society, digital divide, blogging, podcast, online journalism, pornography and cyber law.

Unit-IX Advertising

Advertizing industry in India and world, marketing research; social, economic and cultural impact of advertising on Indians society and Internet advertising.

Unit X Public Relation

Changing trends in public relations, process and models of public relations, experiences and case studies of corporate communications. Corporate communication- principles, practices and trends. Organizational communication, case studies.

Unit-XI Film Theory and Criticism

Origin and growth of film medium. Brief history of Indian cinema.Film theories and criticism, social, political, cultural and gender issues in Indian films. Film genres and trends; and prominent film personalities and their contribution.

Unit-XII Media Law and Ethics

Various provisions relating to media in Indian Constitution. Acts, Ordinances and IPC sections relating to media, Right to Information Act, Press Council and ethics of journalism.

Unit-XIII Radio Production

Radio production: Programmes for various audiences, Different Programme formats, creating audio space, sound perspective, voice casting, types of music, use of sound effects. Production crew and their functions: Role of producer. Production planning and execution. Radio studio, acoustics, recording equipment, types and use of microphones, Use of Digital Technology in production.

Unit-XIV Television Production

Television technology: broadcasting standards, TV Studio lay out, Production equipment- TV production-studio and field production, TV staff and crew, their functions. Programmme formats, Proposal writing, Script writing.TV Production process.TV language and grammar. Classification of shots.Television news production, Editing: Linear and Non-linear, voice over, dubbing, mixing and final mastering.

Written Examination Syllabus for the post of Degree College Lecturers in Residential Educational Institutions Societies

18. Paper – II: Psychology

UNIT I.

Introduction: Schools of Psychology: Structuralism, Functionalism, Psychoanalysis, Behaviorism, and Gestalt, Methods of Psychology: Introspection, Observation, Case Study, Interview, Survey and Experimental Method, Contemporary Approaches to Psychology - Cognitive Approach, Humanistic Approach and Existential Approach, Goals and Fields of Psychology (Pure and Applied).

Biological Basis of Behavior:Nervous System - The Structure of Neuron, Central Nervous, Autonomic Nervous System, and Hormonal Basis of Behavior - The Major Endocrine Glands and their Functions, Influence of Heredity and Environment on Behavior.

Sensation: Sensory Thresholds; Characteristics of Sensation; Types of Sensation; Measurement of sensations(Absolute Threshold, Signal detection theory, DifferenceThreshold, Sensory Adaptation), Attention - Nature and concept of Attention, Different Aspects of Attention – Span, Division, Distraction and Fluctuation, Voluntary and Involuntary Attention, Determinants of Attention – Internal and External Factors.

Perception:Principles of Perceptual Organization, Perceptual Constancies and Depth Perception - Monocular and Binocular Cues, Movement Perception, Internal and External factors influencing Perceptual Experience, Distortions in Perception: Illusions &Hallucinations.

Learning:Concept of Learning Curve, Theories of learning- Classical and Instrumental Conditioning, Sign learning, Learning by Insight and Observation, Role of Motivation, Reward and Punishment in Learning, Transfer of Learning, Efficient Methods of Learning.

UNIT II.

Memory: Meaning and Significance of Memory, Types of Memory, Methods of Measuring Memory, Information Processing Model of Memory, **Forgetting:** Curve of Forgetting, Theories of Forgetting: Decay theory and Interference Theory, Methods of Improving Memory, **Thinking**: Nature and types of thinking, Theories – Bruner & Sullivan, Reasoning – Deductive Reasoning (Conditional, Syllogistic) and Inductive Reasoning (Causal Inferences, Categorical Inferences); aids and obstacles toreasoning, **Problem Solving** Problem cycle, types of problem solving, Impediments to Problem Solving, Problem solving strategies – algorithm, heuristics and biases, Means-End Analysis, Computer simulation, **Creativity -** Characteristics of Creative People; Stages of Creative Thinking. **Emotion and Motivation:** Definition and Nature of Emotions, Development of Emotions, Theories of Emotion – James-Lange, Cannon-Bard and Schachter-Singer, Concept, Theories of motivation.**Intelligence**: Brief history of Testing Movement – contribution of Binet, Theories of Intelligence – Thorndike, Spearman, Thurstone, Sternberg, and Gardener, Measurement of Intelligence-Concept of IQ, Types of Intelligence Tests, Individual differences in Intelligence (Heredity and Environment) **Personality:** Concept of Personality, Personality Assessment - Interviews, Projective tests, Behavioural Assessment, and Personality Inventories, Theoretical approaches to personality **-** Type Theories, Trait theories and Type cumTrait Theories; Psychoanalytic Approach; Humanistic Approach; Cognitive Behavioural Approach, Big Five Factor Theory.

UNIT III.

Statistics in Psychology: Measures of Central Tendency and Dispersion; Characteristics of a Distribution- Skewness and Kurtosis; Meaning of Probability; Normal Distribution-Characteristics and Applications; Methods of Sampling-Probabilistic
and Non Probabilistic sampling; Sampling Distribution; Sampling error and non- sampling error; Hypothesis-meaning and types; Type I and Type II errors; Procedure for testing of Hypothesis; Test of Significance (large sample andsmall sample) - for single mean and differences of mean; Test of Significance for singleproportion and differences of proportion. Analysis of variance (ANOVA) one way ANOVAand two way ANOVA; Linear Correlation – Product moment and Rank correlation. Specialcorrelations – Bi- serial Correlation, and Point

Bi-serial correlation; Partial correlation andMultiple correlation. Simple Regression and Multiple regression. Interpretation ofregression coefficients. Non Parametric Statistics – Chi Square test, Sign test, and Median test. Analysis of Covariance.

UNIT IV.

Social Psychology: Nature and scope of Social Psychology, levels of social behaviour, mechanisms of social andinteraction. Brief introduction to concepts and application of S- R theory, field theory and roletheory.Social perception, theories of attribution social attitudes, their formation anddevelopment.Theories of attitude changes. Prejudice and methods of reducing prejudice.Types of group processes - cohesiveness conformities dynamic, Prosocial behaviour,Leadership, leadership styles and effectiveness. Decision making.Emotionalintelligence and interpersonal relations.Applications of Social Psychology – Ruraldevelopment - human factors in rural development attitudinal basis of rural developmentfactors in acceptance of innovative practices.Social Psychological basis of education. Socialfactors in academic achievement, Cognitive functioning and intelligence Psychological basisof poverty and Deprivation, studies of Disadvantaged groups, method of alleviating poverty,Educational problems of students from Disadvantaged sectors. Environmental Psychology-Concepts and issues of attitudes, awareness and information of environmental pollution.Steps in protecting environment and reducing less pollution.

UNIT V.

Experimental Psychology: Different concepts used in Experimental Psychology(including variables & operationaldefinitions); Psychophysical methods, Lab Report writing as per APA Guidelines(including Citations); Introduction toother Guidelines and style Manuals; Techniques of Experimental Control; Application of Research Designs and interpretation of research problems/studies .

UNIT VI.

Experimental Design: Meaning of Experiment, and Experimental Design; Advantages and disadvantages of experimental designs, Types of Experimental design: Completely randomized design, Randomized Block design, Factorial design, Latin square design; Internal validity andexternal validity of experimental designs, factors that influence the internal validity andexternal validity of experimental designs; Meaning of confounding, Types of confounding,Methods of controlling extraneous variables in Experimental design. Concomitant Variation;Single case experimental designs; Ex-post-facto research designs; Non experimentaldesigns; Advantages and Disadvantages of Experimental designs over Non Experimentaldesigns; Types of Non experimental designs – Quasi experimental designs, Co relationaldesigns, Contrast designs, and Case study designs.

UNIT VII.

Abnormal Psychology: Adjustment and Maladjustment **-** Concept of Adjustment and Maladjustment**,** Causes of Maladjustment; Conflicts – Types; Stress – Nature; Types ofStress, Sources of Stress; Immune System & Stress; Personality & Stress; Coping with Stress – Types of Coping**;** Extreme Maladjustment- Dimensions; Classification – DSM V and ICD 10**;** Anxiety related**-** Post Traumatic Stress Disorder, Phobias and panic disorder, Generalized Anxiety Disorder, Obsessive Compulsive Disorder, Somatic symptom Disorder, Conversion Disorders, Dissociative Amnesia, Dissociative Identity Disorder, Mood **Disorders -** Depression – Characteristics and Symptoms, Bipolar Disorder - Characteristics and Symptoms, Schizophrenia – Symptoms- Positive, Negative and Cognitive Deficits; Types

UNIT VIII.

Approaches and Treatment: Biological Approaches – Brain Dysfunction, Biochemical Imbalances, Genetic Abnormalities, Drug Therapies, ECT& Brain stimulation techniques, Psychosurgery.Psychological Approaches – Psychodynamic, Behavioural, Cognitive, Humanistic, Family Systems Approach, Sociocultural Approaches – Cross cultural issues; Culturally specific therapies, Prevention Programs; Common elements in Effective treatments, Suicide – Type of attempts, gender differences, Risk factors-Mental disorders, Negative life events, Suicide contagion, Personality and Cognitive factors, Biological factors, Prevention.

UNIT IX.

Child Psychology: Principles of Development, Hereditary and Environmental Influences on Development, Aspects of Prenatal and Post-natal Development – Milestones of Development, Hazards of Development and Developmental Delays, Physical Development.Cognitive development: perspectives of Piaget and Vygotsky, Language development, Information Processing; Intelligence, Emotional development, Moral

development – Kohlberg's Theory, Personality development – Overview of Freud and Erikson, Emergence of self and development of self-concept and self-esteem; Development of Gender Roles.

UNIT X.
Adolescent Psychology:
Importance of adolescent psychology, Characteristics and principles of adolescence development, Havinghurst – developmental tasks of adolescence, Puberty - Growth Spurt, Sexual maturation, Psychological effects of pubertal development-concerns about body image. Challenges to early and late development.Changes in the adolescent brain. Sleep patterns in adolescence.Adolescent health – importance of nutrition and exercise. Adolescent sexuality – sexual orientation, sexual morality, sexual behaviour, need for adequate sex education.

Cognitive development – Piaget's formal operational stage. Changes in reasoning, thinking and decision making. Metacognition – aid to self regulatory learning. Development of identity –Erikson's stage of identity vs role confusion, Marcia's ego identity statuses, Rosenberg's model of identity, Importance of self concept and self esteem in adolescence, factors affecting self-concept. Sex role identity.Moral development – Kohlberg's post conventional morality.Peers – functions, peer pressure; friends – stability of friendship.

Issues, Challenges, & Problems - Risk Behaviours: STDs; Teenage Pregnancy, Addiction to Technology, Substance abuse; Juvenile delinquency; Violence and rape; Poverty and low educational attainment; Adolescent stress- external and internal stressors, Obesity and eating disorders.

Written Examination Syllabus for the post of Degree College Lecturers in Residential Educational Institutions Societies

19. Paper – II: Microbiology

I. General Microbiology

History of Microbiology. Contributions of Scientists. Types, application and importance of microscopy.Structure of microbial cells. Methods of sterilization: Physical methods –chemical methods and theirapplication. Pure culture techniques. Preservation methods and Maintenance of Microbial cultures.Microbiological media and cultivation of microorganisms. Microbial identification methods. Principles ofbacterial taxonomy and classification. Microbial growth curve. Measurement of Growth. Synchronous cultures– methods of synchronous culturing. Continuous culturing methods, factors effecting growth. Phenomenonof bacterial sporulation. Microbial nutrition, respiration and fermentation. Distribution, characteristics and reproduction of algae and fungi.

II. Virology

Structure and Classification of bacterial, plant and animal viruses, Methods of cultivation, detection,Propagation and maintenance of viruses. Some important viruses: Influenza virus, Adeno virus, HBV, HIV,T2 phase, TMV, Replication of viruses, Tumor viruses, Interferons and viral interference.

III. Molecular Biology and Microbial Genetics

DNA structure and replication. Transcription and translation. Concept of ribozyme. Genetic code and Wobblehypothesis, Gene regulation. Cloning and expression vectors. Construction and screening of genomic andcDNA libraries. PCR, Genechips and Microarray. DNA markers, fingerprinting and gene therapy. DNAsequencing. Expression of recombinant proteins Protein-protein and protein-DNA interaction. Applicationsof recombinant DNA technology. Types of mutagens, molecular basis and analysis of mutations, site directedmutagenesis. DNA damage and repair mechanisms. Recombination in bacteria by Transformation,Conjugation, Transduction. Transposable elements. Cell cycle and programmed cell death. Signaltransduction, Protein folding & roles of Molecular chaperones. Databases, Sequence and structure analysisof DNA and Proteins. Primer design. Protein engineering and drug designing.

IV. Biochemistry and Techniques

pH and its biological relevance. Redox potentials, Electron transport, oxidative phosphorylation.Classification, chemical structure of important carbohydrates. Properties of amino acids, structure,confirmation and properties of proteins. Enzyme nomenclature, classification, Enzyme activity and inhibition.Enzyme kinetics - Michelis-Menton kinetics. Optical methods - colourimetry and spectrophotometry,fluorimetry, optical rotation, Circular dichroism, NMR, ESR spectroscopy, X-ray diffraction, types of massspectrometry. Chromatographic techniques , diffusion, dialysis, cell disruption methods, centrifugationtechniques, electrophoreses and blotting techniques. Radio isotopes – detection and measurement.

V. Immunology and chemotherapy

Types of Immunity, primary and secondary organs of immune system, cells of immune system.Types, structure, properties and functions of antigens and antibodies, antigen antibody reactions. MajorHistocompatibility Complex (MHC) and transplantation. Polyclonal and monoclonal antibodies.Hypersensitivity, Autoimmunity. Tumor immunology, Immunological tolerance and immuno-suppression,Immune deficiency diseases. Immunotherapy of infectious diseases, immunization. Types of antimicrobialagents and mode of action. Therapeutic agents, Chemical, non-medicinal antimicrobials-sanitizers,disinfectants, antiseptics. Antibiotics. . Antiviral agents. Microbiological assays.

VI. Industrial Microbiology

Exploitation of microbes in industry. Screening, strain development. Types of fermentations processes, scaleupof fermentations. Up and Down stream process. Fermentation productions-Ethanol, Beer, Wine and otheralcoholic drinks, aminoacids, antibiotics, organic acids, vitamins, enzymes, probiotics, solvents and vaccine.Microbial products from genetically modified (cloned) organisms. QA, QC, GLP, GMP, Patents & IPR

VII. Food Microbiology

Dairy Microbiology and microbial products of milk, Fermented foods, Bacteriological examination of milk,fresh foods and canned foods, Food preservation methods and spoilage. Current and future implicationsconcerning food safety, hazards and risks. Probiotics, Prebiotics and their significance in human beings andanimals.

VIII. Environmental and Agriculture Microbiology

Ecological significance. Microbiology of water and sewage treatment. Role of microorganisms in nutrientcycling, Mineralization, Soil humus formation, Nitrogen metabolism, Phosphate solublization. Biofertilizers,Biopesicides, Biodegradation of pollutants. Plant microbe interactions, Animal-microbe interactions: Rumenmicrobiology, termite microbial communities, Microbes in the production of energy from agricultural anddomestic wastes.

IX. Medical Microbiology

Principles of Medical Microbiology, Normal flora of human body. Properties of pathogenic microorganisms,Principles of diagnostic microbiology, Use of lab animals in diagnostic microbiology. Bacterial and viralinfections (Air born, water born, food born, insect born, zoonotic and direct contact), Mycosis, Toxins.

Written Examination Syllabus for the post of Degree College Lecturers in Residential Educational Institutions Societies

20. Paper – II: Public Administration

1. Public Administration – Genesis and growth, meaning, nature, scope and significance; Public and Private Administration; New Public Administration- Minnowbrook I, II & III.
2. Theories of Public Administration – Oriental, Classical, Scientific Management, Bureaucratic, Human Relations, Behavioural, Socio-Psychological, Ecological, New Public Management, New Public Service and Social Justice Approach.
3. Principles of Administration – Hierarchy, Span of Control, Unity Of Command, Delegation, Decentralization, Coordination, Line and Staff, Supervision, Communication, Public Relations.
4. Comparative Public Administration – Nature, Scope and Evolution, Comparative study of the Administration of UK, USA, and India. Development Administration - Nature, Scope, Elements, Models, Changing Dynamics of Development Administration in India, Millennium and Sustainable Development Goals.
5. Union Government and Administration in India – Evolution- Mauryan, Gupta, Moghul, British period; President, Prime Minister, Council of Ministers, Prime Minister's Office, Central Secretariat, Cabinet Secretariat, Election Commission, Finance Commission, Comptroller and Auditor General.
6. State Administration – Governor, Chief Minister, Council of Ministers, Secretariat, Chief Secretary, Departments and Directorates.
7. District Administration – Organisation of District Administration, Role of District Collector in Development, Reorganisation of Districts in Telangana State.
8. Local Government – Meaning, Nature, Scope; 73rd and 74th Constitutional Amendment Acts; Organisation, Powers and functions of Local Government Institutions, Challenges to Local Government Institutions in India, Working of Panchayat Raj Institutions and Urban Local Bodies in Telangana state
9. Personnel Administration – Objectives of personnel administration, classification of services, recruitment, Union Public Service Commission and Telangana State Public Service Commission - Training, Promotion, Discipline, Morale; Staff Associations, Employer - Employee relations
10. Financial Administration - Budget, Principles of Budget, Forms of Budget, Preparation and Execution of Budget, Finance Ministry, Parliamentary Committes- Public Accounts Committee, Estimates Committee.
11. Control over Administration - Legislative, Executive, Judicial control and Citizen control; Good Governance - Transparency and Accountability in Administration – Right to Information Act, Citizen Charter; Public Grievances and Redressal machinery in India – Central Vigilance commission, Central Bureau of Investigation, Lokpal, Lokayukta, Anti-Corruption Bureau and Consumer Protection Mechanism; Administrative Reforms.
12. Welfare Administration- Centre and State Social Welfare institutions and Constitutional bodies; Social Welfare National, State policies and programmes – SC, ST, OBC, Minorities, Women, Child, Differently abled and Old age.
13. Public Policy - Introduction to Public Policy, Theories- Systems, Structural- Functional, Incremental, Elite, Group Theory; Public Policy Making: Role of Legislature, Executive, Judiciary, Bureaucracy, Political Parties, Pressure Groups, Mass Media; Policy Impact and Policy Evaluation- Land Reforms, Irrigation, Education, Health, Food Security and Social Security Policies.
14. Research Methodology - Social Science Research - Importance and Objectivity in Social Science Research; Research Methods – Historical, Analytical, Descriptive, Exploratory, Case Study Method; Research Design; Data Collection - Primary and Secondary Sources; Data Analysis, Interpretation and ReportWriting.
15. Emerging Trends in Public Administration – Values and Integrity in Public Administration, Citizen driven administration, Public-Private Partnership, Disaster Management.

Written Examination Syllabus for the post of Degree College Lecturers in Residential Educational Institutions Societies

21. Paper – II: Sociology

Part I: Sociological Concepts

- Nature and Scope of Sociology, Sociological Perspectives
- Human Society, Individual and Society, Social Group, Community, Association
- Social Structure,Status and Role, Norms,Culture, Socializationand its agencies and theories, Social Institutions, Social Control
- Social Process: Associative and DissociativeSocial Process
- Inequality, Social Differentiation, Social Stratification and its theories and dimensions, Social Mobility
- Social Change: Factors and Theories of Social Change, Evolution, Development, Progress

Part II: Sociological Thought and Theory

- Sociological Thought: Nature, Development and Social Context Contributions of Auguste Comte,Karl Marx, Herbert Spencer, EmileDurkheim, Max Weber and Vilfredo Pareto
- Sociological theory: Nature and types- Paradigms in Sociology
- Structural Functionalism: Radcliffe Brown, Bonislaw Malinowski, Talcott Parsons and Robert K Merton
- Neo Functionalism: Jeffrey Alexander
- Structuration and Post Modernism: Anthony Giddens, Jacques Derridaand Michel Foucault
- Conflict and Neo Marxism: Karl Marx, Georg Simmel, Lewis Coser, Ralf Dahrendorf, Randal Collins, Jürgen Hebermas, Louis Althuser
- Interactionist Perspective:
- Symbolic Interactionism: George Hebert Mead, Charles HortonCooley, Herbert Blumer
- Phenomenology: Alfred Shultz, Peter Berger, Niklas Luhmann
- Ethnomethodology: Harold Garfinkel, Erving Goffman
- Exchange Theory: George Homans, Peter Blau

Part III: Indian Society

- Composition of Indian Society: Cultural, Religious, Regional and Linguistic Diversity, Unity in Diversity
- Foundations of Indian Society: Hindu View of Life, Purusharthas, Varna Dharma and Ashram Dharma
- Marriage and Family in India: Types and Forms of Hindu Marriage, Hindu Marriage as a Sacrament, Marriage Legislation, Marriage among Muslims and Christians, Types of family, Family in rural and urban setting, Changing trends in marriage and family
- Caste, Religion, Economy and Polity: Varna, Jati and Caste- Theories, Features and Functions of Caste system, Cultural and Structural view of Caste System, Social mobility in Caste System, Changing Trends and Future of Caste System, Religion and Ritual System, Socio-Religious Movements, Jajmani System, Land Reforms, Leadership and Polity
- Social change in contemporary India: Sanskritization, Westernization, Modernization and Secularization, Great and Little Tradition, Tradition and Modernity
- Development: Economic development, Human Development, Social Development, Sustainable Development, Nation Building
- Indian experience of development- Five Year Plans- Social consequence of Economic Development- Socio cultural repercussions of Globalization- Social Tensions and Social Resilience
- Contemporary Issues and Debates Population Explosion, Poverty, Slums, Displacement, Ecological Degradation, Environmental Pollution, Health Problems and Health Care Delivery, Familial Problems: Gender Inequality, Domestic Violence, Dowry, Divorce and Inter- Generational problems, Crime and Delinquency, White Collar Crime, Corruption, Drug Addiction, Youth Unrest, Suicides, Issues of Migration

Part IV Research Methodology

A. Nature of Social Phenomenon, Scientific Method, Applicability of Scientific Method to Social Phenomenon, Objectivity and Subjectivity, Reliability and Validity, Theory, Fact and Hypothesis
B. Selection of Research Problem, Social Survey, Research Design and its types, Field work, Pre-test, Sample and is types
C. Techniques and Methods data Collection: Observation, Questionnaire, Schedule, Interview, Participant Observation, Case Study, Content Analysis, Life History,

Historical Method

D. Techniques of Data Analysis, Classification and Tabulation, Diagrammatic and Graphic Presentation
E. Statistics in Social Research: Measures of Central Tendency, Measures of Dispersion, Correlation Analysis, Measures of Association and Test of Significance
F. Research Report

Part –V: Rural Sociology

- **Approaches to the study of Rural Society:**
  Rural –Urban differencesRurbanism Peasant studies
- **Agrarian Institutions:**
  Land ownership and its types Agrarian relations and Mode of production debate Jajmani system and Jajmani relations Agrarian class structure
- **Panchayati Raj System:**
  Panchayat before and after 73rd Amendment Rural Leadership and Factionalism Empowerment of people
- **Social Issues and Strategies for Rural Development:**
  Bonded and Migrant Labourers Pauperization and Depeasantisation Agrarian unrest and Peasant movements
- **Rural Development and Change:**
  Trends of Changes in rural society Process of change: Migration – Rural to Urban and Rural to Rural Mobility: Social / Economic Factors of change

Part-VI: Industry and Society

- **Industrial Society in the Classical Sociological Tradition:** Division of Labour Bureaucracy Rationality Production relations Surplus value Alienation
- **Industry and Society:**
  Factory as a social System Formal and informal organization Impact of Social structure on industry Impact of industry on society
- **Industrial Relations:**
  Changing profile of labour Changing labour-management relations Conciliation, adjudication, arbitration Collective bargaining Trade unions
  Workers' participation in management (Joint management Councils) Quality circles
- **Industrialization and Social change in India:**
  Impact of industrialization on family, education and stratification Class and class conflict in industrial society Obstacles to and limitations of industrialization
- **Industrial Planning:**
  Industrial Policy Labour legislation Human relations in industry

Part-VII: Sociology of Development

- **Conceptual Perspectives on Development:**
  Economic growth Human development Social development Sustainable development
- **Theories of Underdevelopment:**
  Liberal: Max Weber, Gunnar Myrdal Dependency: Centre-perphery (Frank), Uneven development (Samir Amin), World-System theory (Wallerstein)
- **Paths of Development:** Modernization, Globalisation Socialist Mixed Gandhian
- **Social Structure and Development:**
  Social Structure as a facilitator/ inhibitor Development and socio-economic disparities Gender and development
- **Culture and Development:**
  Culture as an aid / impediment Development and displacement of tradition
  Development and upsurge of ethnic movements

Part-VIII: Population and Society

- **Theories of Population Growth:**
  Malthusian Demographic transition
- **Population Growth and Distribution in India:** Growth of Indian population since 1901 Determinants of population
- **Concepts of Fertility, Mortality, Morbidity and Migration:** Age and Sex composition and its consequences Determinants of fertility Determinants of mortality, infant, child and maternal mortality Morbidity rates Determinants and consequences of migration
- **Population and Development:**
  Population as a constraint on and a resource for development Socio-cultural factors affecting population growth
- **Population Control:**
  Population policy: Problems and perspectives Population education Measures taken for population control.

Written Examination Syllabus for the post of Degree College Lecturers in Residential Educational Institutions Societies

22. Paper:II: BUSINESS ADMINISTRATION

UNIT – 1: MANAGEMENT: Meaning –Role & Importance – Functions of Management- Planning & Types of Plans – Decision Making – Organizing – Formal and Informal Organization Structure - Span of Management - Delegation of Authority - Centralization and Decentralization – Communication – Process, Channels & Barriers - Leadership –&Theories – Coordination – Controlling.

UNIT – 2: ORGANIZATIONAL BEHAVIOUR (OB): Concept & Significance – OB Models – Understanding and Managing Individual Behaviour – Perception – Values – Attitudes - Learning - Understanding and Managing Group Behaviour – Interpersonal Relations - Group Dynamics & Team Building - Organization Culture – Concept & Determinants – Managing Change – Conflict Management –Stress Management.

UNIT – 3: MANAGERIAL ECONOMICS: Fundamental Concepts – Law of Demand - Demand Analysis – Demand Forecasting – Production Function – Cost Function - Market Structure and Pricing – Perfect Market, Imperfect Market, Monopoly & Oligopoly- Pricing Policies and Methods – Profit Concepts & Measurement – Break Even Point.

UNIT – 4: BUSINESS ENVIRONMENT: Meaning – Constituents of Internal & External Environment – Liberalization – Privatization –Globalization – Foreign Trade and EXIM Policy – Foreign Capital & Collaborations – Monetary & Fiscal Policies – Free Trade Vs Protectionism – Cartelization – WTO.

UNIT – 5: HUMAN RESOURCE MANAGEMENT: Meaning – HRM Vs HRD – Human Resource Planning – Job Analysis – Job Description – Recruitment and Selection – Induction – Training and Development – Job Evaluation – Concept & Methods – Performance Appraisal – Meaning & Methods – Motivation – Concept, Theories, & Techniques – Compensation Management.

UNIT – 6: STRATEGIC MANAGEMENT: Meaning & Importance – Mc Kinsey 7S Framework – Corporate Governance - Strategy Analysis & Strategy Formulation – Business Portfolio Analysis - Strategic Control & Evaluation – Strategic Alliances.

UNIT – 7: MARKETING MANAGEMENT: Concepts of Market & Marketing – Marketing Environment - Marketing Mix – Consumer Behaviour – Determinants & Models – Market Segmentation – Targeting & Positioning - Branding – Product Life Cycle – Promotion Mix – Services Marketing –Marketing Research –New Trends in Marketing.

UNIT – 8: PRODUCTION MANAGEMENT: Role & Scope of Production Management – Product Selection – Process Selection – Facilities Location – Lay out Planning – Work and Job Design – Operation Planning and Control – Mass Production – Batch Production and Job Shop Production – Planning and Control Process – Network Analysis – PERT & CPM - Value Engineering – Business Process Re-engineering - Quality Assurance – Supply Chain Management-Concept.

UNIT – 9: QUANTITATIVE TECHNIQUES: Relevance of QT in Decision-Making – Research Process - Central Tendency – Dispersion – Data Collection (including Sampling Methods) - Probability Distributions – Concepts; Discrete Probability Distributions; & Continuous Probability Distributions -- Test of Hypothesis – Chi-square Test & ANOVA – Business Forecasting Methods – Correlation, Regression, & Time Series Analysis – Report Writing.

UNIT – 10: OPERATIONS RESEARCH: Meaning – Importance – Role – Linear Programming – Minimization and Maximization Methods – Graphic Method – Transportation and Assignment Problems – Goal Programming – Dynamic Programming – Inventory Control Models – Queuing Models – Decision Theory – Game Theory – Simulation.

UNIT – 11: FINANCIAL, COST & MANAGEMENT ACCOUNTING: *AccountingConcepts – Principles – Conventions - Accounting Standards – Indian Accounting Standards (IND AS)- Cost Accounting – Classification of Cost –Cost Sheet – Standard Costing – Process Costing - Job & Batch Costing - Preparation and Analysis of Financial Statements - Inflation Accounting – Cost-Volume-Profit Analysis.*

UNIT – 12: FINANCIAL MANAGEMENT: Meaning & Importance – Objectives – Sources of Finance – Investment Decisions - Financing Decisions - Dividend Decisions Ratio Analysis - Working Capital Management – Cash Management – Receivables Management - Inventory Management.

UNIT – 13: INFORMATION TECHNOLOGY FOR MANAGERS: Hardware & Software – Operating Systems – Functions & Types - DBMS – Network Topologies – Types of Networks – Management Information System – SDLC – Data Analytics.

Written Examination Syllabus for the post of PHYSICAL DIRECTOR (DEGREE COLLEGE) in Residential Educational Institution Societies

23. Paper-II- Physical Education

I. Bases of Physical Education:

Nature and Meaning of Physical Education; The biological basis of life; Growth and Development; Physical Education and Recreation as socializing factors – Cooperation and Competition; Character building and Adjustive development through Games and Sports. Philosophy of Physical Education History of Physical Education – Ancient History, Greece, *Sprata*, Athens, Ancient Rome – German, Ancient Modern, Olympic moment, Historical development of Physical Education of in India and status of various committees and their recommendations

II. Organization and Administration of Physical Education

Meaning of the terms organization, Administration and Supervision; Guiding Principles of Organization; Play fields – Construction and Maintenance – Equipment – Purchase and Care and Maintenance; Layout and Maintenance of Swimming Pool Athletic Track and Gymnasium; Time Table; Sports Budget and Accounting; Records and Registers; Concept and types of Supervision; Qualities of good Supervisors, Guiding principles of Supervision.

III. Sports Psychology

Psychology, Meaning and Definition of Psychology – Definition of Sports Psychology, need and importance – Development and stages – Motor development, Social Development – Role of Maturation – Individual differences, Personality and well-built sports personality, Types of personality, Theories of personality – Emotion, positive and negative emotion – Anxiety – Aggression – Arousal and Activation, role of emotion in sports and control of emotion in sports; Play – Theories of Play Learning – Kinds of Learning – Laws of Learning – Learning curve – Transfer of Training. Motivation – Meaning, definition and its importance.

IV. Methods and Materials in Physical Education

Presentation techniques – Personal and Technical – Management of Class; Methods of Teaching – Factors influencing method – Verbal Explanation, Demonstration, Explanation, Discussion and Supervision; Lesson Planning; Tournaments – Types of Tournaments – Knock out, League and Combination – Fixtures for Tournaments – Knock-out League fixtures; Classification – Classification of Students – Homogenous group and Heterogeneous group; Characteristics of Good Test; Sports Training Method of Training - Definition of Sports Training – importance of Training – Types of Training Methods – Resistance, circuit, Interval and Continuous warning up types and cool down Fatigue – Types of Fatigue – Effect on sports performance; Various Recovery methods and types of recovery.

V. Anatomy and Physiology and Kinesiology

Structure and Functions of cell; Skeletal system; Muscular system, Respiratory system; Digestive system; Circulatory system; Excretory system Nervous system - Structure and Functions of Human Brain and Spinal cord and their effect with exercise; Kinesiology

VI.Health Education, Safety Education in Physical Education Curriculum

Health meaning, nature and need of Health ;Definition of Health, Hygiene and Sanitation; Factors influencing Health – Heredity, Habits and Environment; Factors influencing Physical, Mental Health and Social Health; Communicable diseases – Prevention and Control – Tuberculosis, Cholera; Malaria, Typhoid, Measles and Whooping cough; Food and Nutrition – Essential Constituents of food – Proteins, CHO, Fats, Minerals, Vitamins – Balanced DIET – Under nutrition and malnutrition.; Posture – Definition – Values of Good Posture – Common Pastural deformities – Kyphosis, Lordosis, Scoliosis, knocked – knees, Flat foot; Coordinated School Health programme – Health Services, Health Instruction, Health Supervision and Health Record; Safety Education – Safety on Road, Safety in the School, Safety on playfields; Pollution – Air and Water Pollutions and their prevention and control, Sports injuries – Prevention of injuries – Sports Physiotherapy.

VII. Yoga and Physical Education

Yoga – Definition, Meaning and Objectives; Values of Streams of Yoga – Jnana, Bhakti, Karuna, Raja Yoga; Relationship of Yoga with Physical Education and Health; PatanjaliAshtanga Yoga; Yama, Niyama, Asana, Pranayama, Prathyahasa; Dharma, Dhyana and Samadhi; Pranayama – Meaning and importance; Stages of Pranayama Physiological values of Pranayama ; Effect of yoga, exercises and cure of the diseases, Physiology of Exercise; Warming up, Conditioning, Motor end plate, Glycolysis, effective of exercises on respiratory muscular and cardiovascular systems.

VIII. Officiating and Coaching of Physical Education

Meaning and Principles of officiating; Duties of Referee / Umpires / Scorer's coach in various Games; Athletics – Runs, Throws and Jumps; Marking, Rules, Signals and Systems of Officiating in the following Games; Volley Ball, Basket Ball, Kabaddi, Kho Kho, Soft Ball, Ball Badminton, Hockey, Foot Ball, Cricket, Tennikoit, Hand Ball; Qualities of good official and coach.

Written Examination Syllabus for the post of LIBRARIAN (DEGREE COLLEGE) in Residential Educational Institutions Societies

24. Paper II: Library & Information Science:

Unit-1: Foundations of Library and Information Science

Five Laws of library Science; Types of Libraries and their functions; Library Movement in Telangana, Important libraries in Telangana; Library legislation in India; Library Extension Services; Library Association in India, UK and USA - ILA, IASLIC, SIS, LA and ALA; National & International organizations promoting Library Development-RRRLF, NASSDOC, NISCAIR, DESIDOC, IFLA and UNESCO

Unit-2: Information, Communication and Society

Data, Information and Knowledge; Information as a Resource / Commodity; Role of Information in Socio-Economic Development; Information Society, Knowledge Society; Knowledge Management; Information Generation, Collection, Storage and Dissemination; Communication -Channels, Barriers; National Knowledge Commission; Intellectual Property Rights; Copyright; Right to Information Act

Unit-3: Information Sources

Source of Information-Primary, Secondary and Tertiary; Documentary and Non-documentary; Reference Sources- Dictionaries; Encyclopedias; Geographical Sources; Biographical Sources; Year Books / Almanacs, Directories and Handbooks; Statistical sources; Bibliographies, Union Catalogues, Indexing and Abstracting Periodicals; Serial Publications; E-Documents - e-Books; E-Journals; Databases-Bibliographic; Numeric; and Full text

Unit-4: Information Services

Information services- Bibliographic services, Indexing and Abstracting services, CAS, SDI, Document Delivery Services, Referral services; Online Services; User Education and User Studies; Information. Seeking Behaviour and Information Needs; Information Literacy.

Unit-5: Information Processing (Classification and Cataloguing)

Organization of knowledge/information; Modes of formation of subjects; Library classification-Canons, Laws and Principles; Notation & Mnemonics; Fundamental categories; Call Number; Common isolates; Library classification Schemes-DDC, UDC, and CC; Library Cataloguing-Canons, Laws and Principles; Library cataloguing codes-CCC and AACR-II; Bibliographic standards: ISBD, MARC and CCF; Indexing-Pre-Coordinate , Post-Coordinate; Vocabulary control - Thesaurus, Lists of Subjects Headings; Information Storage & Retrieval (ISAR): Search Strategies; Boolean Operators; Evaluation of ISAR

Unit-6: Library Management

Management-Principles, Functions, Schools of Thought; Organizational Structure; Planning ; Decision making; System study-Analysis, evaluation and design; Collection Development (Books Serials, non-book, Material)- Principles of book selection; acquisition procedures; ISBN, ISSN; Maintenance; Preservation & Conservation; Human Resources Management; Financial Management-Resources generation, Budgeting, Cost and Cost-Benefit analysis; PERT, CPM; Library Buildings, equipment & furniture; Marketing information products and services; Total Quality Management (TQM)

Unit-7: Fundamentals of Information Technology

Information Technology –Software and Hardware; storage devices; Software – Operating Systems; Application Software; Client-Server Technology; Different types of Servers.; Communication Technology – Telecommunications; Modem; Router; Wi Fi; Transmission Media; Networking Concepts – Topologies- LAN, MAN, WAN; Communication Tools and Techniques – Fax, E-mail, Tele Conferencing, Video Conferencing, Voice Mail. Hyper Text and Hyper Media. List Serve / Electronic groups.; Standards; Protocols and Formats; Interoperability; Internet Basics – WWW; Web Browsers; Search Engines; Internet Connectivity; Data Security- Computer Viruses.

Unit-8: Library Automation and Networks

Library Automation -Areas of Automation; Hardware and Software selection; OPAC; Resource Sharing and Library Networks-ERNET, NICNET, DELNET, INFLIBNET; OCLC; Library Consortia; Information systems- INIS, AGRIS, PUBMED, INSPEC; Software for Library Automation.

Unit-9: Digital Libraries

Digital Library Initiatives; Digitization – Software & hardware; Standards; File formats; Metadata; Digital Collection Management – e-books; e-journals; Databases; Electronic Thesis & Dissertations; Resource Discovery – Search engines; search tools & techniques; Digital Rights Management, copyright & plagiarism

Unit-10: Research Methodology

Types of Research; Scientific Method; Hypothesis, Data Collection; Sampling techniques; Methods of Research-Historical, Case Study, Survey, experimental method etc.; Data Analysis & Interpretation; Report Writing; Bibliometric, Scientometrics and Webometrics.