

DETAILED SYLLABUS FOR THE POST OF RESEARCH OFFICER IN ECONOMICS AND STATISTICS

(Category No.: 414/2025)

(Total : 100 Marks)

Part I - Statistics (Max: 40 Marks)

UNIT I (10Marks)

- (i) Indian and State statistical systems. Planning and execution of surveys,
- (ii) Collection of Data: Primary and Secondary data. Sampling: Census and Sample method. Methods of sampling: Random Sampling methods- Simple random sampling. Stratified sampling, Systematic sampling. Multistage sampling. Non-random sampling methods- Judgment sampling, convenience sampling. Quota sampling.
- (iii) Classification and Tabulation of data, Diagrammatic Presentation of Data: One dimensional diagram.two dimensional diagrams, Pictograms and Cartograms. Graphical Presentation of data: Histogram.Frequency Polygon, frequency curve. Cumulative Frequency Curves(iv) Measures of Central tendency: Mean, Median, Mode, Harmonic mean. Geometric mean.
- (v)Measures of Dispersion: Range. Quartile deviation, Mean deviation, Standard deviation. Relative measures of dispersion (vi) Measures of Skewness and Kurtosis

UNIT II (10 Marks)

- (i) Correlation and Regression Analysis: Methods of studying Correlation, Regression lines, curve, fitting -linear and non-linear (logarithmic, exponential). Forecasting.
- (ii) Multiple Correlation and Multiple regression analysis: Multicollinearity, Heteroscedasticity, Autocorrelation (Basic concepts only).
- (iii) Optimization Techniques: Optimization with equality Constraints- the Lagrange multiplier method.Optimization with inequality Constraints- Linear programming problems (basic concepts only).
- (iv) Time series Analysis: Components of Time series. Measurement of Trend. Measuring Trend by Logarithms, Exponential Trends. Growth Curves
- (v) Index Numbers: Methods of constructing index numbers. Consumer Price Index numbers.
- (vi) Vital Statistics: Methods of Obtaining Vital statistics. Measurement of Fertility- Crude Birth rate, Specific Fertility rate. Crude Death rate. Standardized Death rates, Infant Mortality rate. Maternal Mortality Rate. Reproduction rate. Rate of Net Migration.

UNIT III (10 Marks)

- (i) Probability: Classical definition, Axiomatic definition. Basic concepts, Theorems in probability.Conditional Probability, condition for independence. Bayes theorem.
- (ii) Univariate Random variables: Discrete and Continuous random variables, Probability function, Cumulative Distribution function (iii) Mathematical Expectation (iv) Standard distributions: binomial, Poisson and normal distributions.
- (v)Sampling Distributions- Student's t distribution. Chi-square distribution,

Snedecor's F-distribution (Basic concepts only).

UNIT IV

(10 Marks)

- (i) Theory of Estimation: Point Estimation, Interval estimation of means, proportions and variances.-
- (ii) Testing of Hypotheses : Level of significance. Power of the test (iii) Tests of significance of means for large sample and small sample- Tests of significance of proportions. Tests of significance of and variances (iv) Chi-square tests: test of Independence of attribute, test of homogeneity, Test of goodness of fit

Part II - Economics (Max: 30 Marks)

UNIT I

(15 Marks)

- (i) Planning and the case for Decentralized Planning in India and Kerala -Panchayath Raj - Finance Commissions and fiscal devolution.
- (ii) Budget -Preparation and Execution.
- (iii) National Income and related Concepts- Trends and pattern of National Income growth- Methods of Calculating National Income and their short comings.
- (iv) Primary, Secondary and Tertiary Sectors of Indian Economy and their contributions towards GDP, Structural transformation of Indian Economy-composition of State Domestic product of Kerala
- (v) Success and failures of planning in India-Alternatives to planned development

UNIT II

(15 Marks)

- (i) Demographical trends and patterns in India and Kerala
- (ii) Poverty, Unemployment and Inflation in India - their causes and effects, Poverty alleviation measures -inflation targeting, educated unemployment and man power planning in Kerala.
- (iii) Organized and Unorganized sectors in India and Kerala- Internal and External migration, causalization of employment, labour welfare measures, labour market reforms.

Part III - Mathematics (Max: 20 Marks)

Unit I

(10 Marks)

Quantitative Aptitude : Ratio, proportion and variation, L.C.M and H.C.F, laws of exponents, square roots and cube roots, logarithms, percentages, simple and compound interest, profit and loss, discounts, time and distance, time and work, averages.

Algebra : Number system -integers, rational numbers, irrational numbers and real numbers.

Set theory - Sets and operations on sets.

Logarithms - laws of logarithms including change of base, common logarithms, simple applications of logarithms.

Linear equations, Quadratic equations and their roots.

Linear inequalities, solution of system of linear inequalities with two variables.

Sequence and series - sequences and examples of finite and infinite sequences.

Arithmetic progression

(AP), Geometric progression (GP), Harmonic progression (IIP). Permutation and combination, Binomial theorem.

Matrices : concept, notation, order, types of matrices, basic operations on matrices, determinant of a matrix, inverse of a matrix. System of linear equations and their solutions - Matrix inversion method, Cramer's rule.

Basic Computer Knowledge : basic knowledge of computers - operating systems - use of MS Office - use of mathematical and statistical functions in computer packages like Excel, SPSS etc.

Unit II

(10 Marks)

Calculus : Relations and functions - reflexive, symmetric, transitive and equivalence relation, injective, surjective and bijective functions, composition of functions and invertible functions. Limit and continuity, differentiability, derivative of different types of functions and second order derivatives. Applications of derivatives - rate of change, increasing and decreasing functions, maxima and minima- marginal cost, marginal revenue, and simple problems. Idea of partial derivatives.
Integration - idea of integration - simple examples - definite integrals. Applications of integrals -total revenue, total cost - simple problems. Differential equations - order and degree, formation, general and particular solutions of a differential equation- solution of first order ordinary differential equations.
Coordinate geometry : Coordinate system in two dimensional geometry, - distance formula, section formula, straight lines, circles and conic sections.

Part IV- GENERAL KNOWLEDGE AND CURRENT AFFAIRS & RENAISSANCE IN KERALA

(Max: 10 Marks)

General Knowledge and Current Affairs

RENAISSANCE IN KERALA

TOWARDS A NEW SOCIETY

Introduction to English education - various missionary organisations and their functioning- founding of educational institutions, factories, printing press etc.

EFFORTS TO REFORM THE SOCIETY

(A) Socio-Religious reform Movements

SNDP Yogam, Nair Service Society, Yogakshema Sabha, Sadhu Jana Paripalana Sangham, Vaala Samudaya Parishkarani Sabha, Samathwa Samajam, Islam Dharma Paripalana Sangham, Prathyaksha Raksha Daiva Sabha, Sahodara Prasthanam etc.

(B) Struggles and Social Revolts Upper cloth revolts.Channar agitation, Vaikom Sathyagraha, Guruvayoor Sathyagraha, Paliyam Sathyagraha. Kuttamkulam Sathyagraha, Temple Entry Proclamation, Temple Entry Act .Malyalee Memorial, Ezhava Memorial etc.

Malabar riots, Civil Disobedience Movement, Abstention movement etc.

ROLE OF PRESS IN RENAISSANCE

Malayalee, Swadeshbhimani, Vivekodayam, Mithavadi, Swaraj, Malayala Manorama, Bhashaposhini,Mathnubhoomi, Kerala Kaumudi, Samadarsi, Kesari, Al-Ameen, Prabhatham, Yukthivadi, etc

AWAKENING THROUGH LITERATURE

Novel, Drama, Poetry, Purogamana Sahithya Prasthanam, Nataka Prashtanam, Library movement etc

WOMEN AND SOCIAL CHANGE

Parvathi Nenmenimangalam, Arya Pallam, A V Kuttimalu Amma, Lalitha Prabhu.Akkamma Cheriyan, Anna

Chandi, Lalithambika Antharjanam and others

LEADERS OF RENAISSANCE

Thycaud Ayya Vaikundar, Sree Narayana Guru, Ayyan Kali.Chattampi Swamikal, Brahmananda

Sivayogi, Vagbhadananda, Poikayil Yohannan(Kumara Guru) Dr Palpu, Palakkunnath Abraham Malpan, Mampuram Thangal, Sahodaran Ayyappan, Pandit K P Karuppan, Pampadi John Joseph, Mannathu Padmanabhan, V T Bhattathirippad, Vakkom Abdul Khadar Maulavi, Makthi Thangal, Blessed Elias Kuriakose Chaavra, Barrister G P Pillai, TK Madhavan, Moorkoth Kumaran, C. Krishnan, K P Kesava Menon, Dr.Ayyathan Gopalan, C V Kunjuraman, Kuroor Neelakantan Namboothiripad, Velukkutty Arayan, K P Vellon, P K Chathan Master, K Kelappan, P. Krishna Pillai, A K Gopalan, T R Krishnaswami Iyer, C Kesavan. Swami Ananda Theerthan , M C Joseph, Kuttippuzha Krishnapillai and others

LITERARY FIGURES

Kodungallur Kunhikkuttan Thampuran, KeralaVarma Valiyakoyi Thampuran, Kandathil Varghesc Mappila. Kumaran Asan, Vallathol Narayana Menon, Ulloor S Parameswara Iyer, G Sankara Kurup, Changampuzha Krishna Pillai, Chandu Menon, Vaikom Muhammad Basheer. Kesav Dev, Thakazhi Sivasankara Pillai, Ponkunnam Varky, S K Pottakkad and others

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NOTE: - It may be noted that apart from the topics detailed above, questions from other topics prescribed for the educational qualification of the post may also appear in the question paper. There is no undertaking that all the topics above may be covered in the question paper