A N E X U R E - 'A'

SYLLABUS FOR COMPETETIVE EXAMINATION FOR RECRUITMENT TO THE POST OF DISTRICT STATISTICAL OFFICER / RESEARCH OFFICER UNDER THE DIRECTORATE OF ECONOMICS & STATISTICS, ITANAGAR

DIRECTORATE OF ECONOMICS AND STATISTICS
GOVERNMENT OF ARUNACHAL PRADESH
ITANAGAR

SECTION - I

WRITTEN EXAMINATION:- The standard of papers in General studies and General English will be such as may be expected of a graduate of an Indian University.

The standard of papers in the optional subjects will be that of the Maste degree examination of an Indian University in the relevant disciplines. The candidates will be expected to illustrate theory by facts. They will be expected to be conversant with Indian problem in general and Arunachal problem in particular in the field of Economics / Statistics.

1. GENERAL ENGILISH

The aim of the paper is to test the candidates ability to read and understand serious discursive prose, and to express his ideas clearly and correctly in English.

The pattern of the questions will be broadly as follows:

(i) Comprehension of given passages.
(ii) Precis writing.
(iii) Paragraph writing.
(iv) Letter Writing.
(v) Usages and Vocabulary.
(vi) Other test on English Language.

2. GENERAL KNOWLEDGE / GENERAL STUDIES

General Knowledge includes knowledge of current events and of such matters of every day observation and experience in their scientific aspect as may be expected from an educated person who has not made a special study of any scientific subject. The paper will also include questions of Indian Polity including the political system and the constitution of India. History of India and Geography of a nature which a candidate should be able to answer without special study.

3. OPTIONAL SUBJECTS

(I) Economics -

(II) Statistics –

(III) Mathematics –

(IV) Commerce –

SECTION – II

VIVA VOCE :- The candidates will be interviewed by a board of members who will have before them a records of their career. The subject of the interview is to assess the suitability of the candidates for a career in public service. The interview is intended to supplement the written examination for testing the general and specialized knowledge and abilities of the candidate. The candidates will be expected to have taken an intelligent interest not only in their subjects of academic study but also in events which are happening around them both within and outside their own state or country, as well as in modern current of thoughts and in new discoveries which should rouse the curiosity of well educated youth.

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ECONOMICS

1. MICRO AND MACRO ECONOMICS.

Unit-I Production: Production function – Returns to scale and Returns to factors – Elasticity of factor Substitution- Types of production function: Homogenous, homothetic and Cobb-Douglas production function.

Unit-II Market: Equilibrium under perfect, Competition, Monopoly, Discriminating monopoly, Monopolistic Competition and Oligopoly.

Unit-III Factor Pricing: Marginal productivity, Euler's Theorem and Adding-Up problem- wage determination under perfect competition, loanable fund theory of interest, innovation theory of profit.

Unit-IV Welfare Economics: Pareto optimality, Pareto optimality conditions: Consumption, production and exchange, critical evaluation of Pareto optimality – compensation tests: Kaldor, Hicks and Scitovsky and Little's Criterion.

UNIT-V Classical and Keynesian Economics: Classical theory of income, employment, wage rate and price level, - concept of macro equilibrium in classical model – classical dichotomy-causes of unemployment – Evaluation of classical model. Keynesian Concept of macro equilibrium, determination of income, output and employment – consumption function – Multiplier in an open economy.

2. PUBLIC FINANCE, INTERNATIONAL TRADE AND DEVELOPMENT ECONOMICS.

Unit-I Government Budgets: Balanced and unbalanced, economic and functional classification of budget, Incremental budget and zero based budget, concept of deficit in Government budget- revenue, fiscal, budgetary and primary deficit- sources of Government borrowing.

Unit-II Balance of Payments and Foreign Exchange Markets: Component of balance of payments – Relative importance of Current account and Capital account – Balance of payments adjustment : Absorption and monetary approaches (Harry Johnson) – Foreign trade Multiplier.

Foreign exchange market – Exchange rate determination: Purchasing power parity theory- interest arbitrage, hedging, premium and discount.

Unit-III Development Economics: Economic growth and economic development-Measurement of economic development- Obstacles to economic development- Kuznet's characteristics of modern economic growth- concept of human development-Rosenstein-Rodan's big-push theory. Hirschman's theory of unbalanced growth, balanced-vs.-unbalanced growth- Lewis theory of development with the unlimited supply of labour.

3. STATISTICS.

Unit-I Measures of Central Tendency and Dispersions: Arithmetic, Geometric and Harmonic means, Median and Mode for grouped and Ungrouped data, Range, Quartile – Deviation, mean-Deviation, Standard-Deviation, co-efficient of variation for both grouped and ungrouped data.

Unit-II Correlation and Regression: Relationship between two Variables – Karl Pearson's Coefficient of correlation and its properties – Spearman's rank correlation. Regression – Estimation of two regression lines – Angle between two regression lines properties of regression coefficient.

Unit- III Index Number and Time Series:

Index Number – Laspeyre's, Paasche's and Fisher's index number – Test for ideal index number – Base shifting, base splicing and deflating.

Time Series – Components of time series – Methods of estimation of linear and non-linear trend.

Unit-IV Sampling distribution: Meaning, types of sampling, simple, systematic and stratified random sampling, advantages of sampling Over Census, Standard Error and its significance.

4. INDIAN ECONOMICS WITH SPECIAL REFERENCE TO NORTH-EAST ECONOMY.

Unit-I National Income, Employment and price Behaviour: National Income – Trends in growth and Structure, performance of different sectors. Employment and unemployment: Recent trends and estimates – changing structure and emerging issues – Inflation: Recent trends in prices in India and its causes, price stability.

Unit-II India's Economic Reforms: Rationale for Economic reforms, Main components of structural reforms:– Evaluation of structural reform – Impact of WTO on Indian economy – Foreign capital and MNCs in India.

Unit-III Economy of North East India: Basic Features of North East economy – Relative performance of the North East economy in the country – Level and growth of NSDP and Per Capita NSDP, Population: Trends and features, Causes for its rapid growth,– Agricultural practices in the region – permanent cultivation. Shifting cultivation and its effects – causes of low agricultural productivity – factor inhibiting the growth of industries – Infrastructure development.

STATISTICS

UNIT- I Meaning, Importance, Functions and Limitations of Statistics-Collection of primary and Secondary Data- Accuracy, Approximation and Errors-Classification, Seriation and Tabulation-Ratios, Percentages and Logarithms-Diagrammatic and Graphic Representation of data.

Unit II MEASURES OF CENTRAL TENDENCY –
Measures of Dispersion-Moments, Skewness and Kurtosis.

Unit III INDEX NUMBERS

Techniques of construction of wholesale Price Index Numbers, Cost of Living Index Numbers and Indices of Industrial Production-Fixed Base and chain Base Index Numbers-Base shifting-spliting of index numbers-Deflating of index numbers-Tests of Index numbers.

Unit IV TIME SERIES

Curve fitting and method off least squares-Measurement of seasonal, cyclical, and irregular Fluctuations.

Unit V CORRELATION

Coefficient of Correlation, Regression and Ratio of variation-simple and multiple Linear Regression, Regression coefficient. Attributes and Consistency of data, classification of data, rules for testing consistence of data-Methods of Interpolation.

Unit VI PROBABILITY

Random experiment, sample space, event, algebra of events, probability on a discrete sample space, basic theorems of probability and simple examples based conditional probability of an event, Independent event, discrete and continuous random variables and their distributions, expectation, moments, moment generating function, joint distribution of two or more random variables, marginal and conditional distributions, independence of random variables, covariance, distribution of a function of random variables, Bernoulli, binomial, geometric, exponential, normal distributions, real-life situations where these distributions provide appropriate models, Central limit theorem for independent and identically distributed random variables with finite variance and their simple applications.

Unit VII SAMPLE THEORY AND DESIGN

Complete enumeration Vs. sampling, need for sampling, basic concept in sampling, designing large-scale surveys, sampling and non-sampling Errors, simple random sampling, properties of a good estimator, Estimation of sample size, Stratified Random Sampling, Systematic sampling, Cluster sampling, Ratio and regression methods of estimation under simple and stratified random sampling, double sampling for ratio and regression method of estimation, two-stage sampling with equal size first-stage units.

Unit VIII ANALYSIS OF VARIANCE

Analysis of variance with equal number of observation per cell in one, Two and three way classifications, basic principles of experimental designs, completely randomized design, randomized block design, latin square design, missing plot technique 2^{nd} factoral design, total and partial confounding.

UNIT IX STATISTICAL QUALITY CONTROL

Process and product control-general theory of control charts, different types of control charts for variable and attributes, $\bar{X}$,R,S,P, np and C charts, cumulative sum chart, v-mask, single, double, multiple and sequential sampling, plans for attributes.

UNIT X OFFICIAL STATISTICS

Present official statistical system in India relating to population, agriculture, industrial production, trade and prices, methods of collection of official statistics, their reliability and limitation and the principal publications containing such statistics, various official agencies responsible for data collection and their main functions.

UNIT XI DEMOGRAPHY

Demographic data from census, registration, NSS and other surveys and their limitation and uses, construction and used of vital rates and ratios, ,measures of fertility, reproduction rates, morbidity rates. standardised death rate, complete and abridged life tables, construction of life tables from vital statistics and census returns, use of life tables, logistic and other population growth curves, fitting of logistic curve, population projection

MATHEMATICS

Unit I MATRICES AND VECTOR SPACE

Matrices, Addition, Multiplication, Determinants of a matrix, Row and Column reduction, Rank, Orthogonal ,Eigen value and Eigen vector
Vector space, Linear dependence and independence, Sub-spaces, Bases, Dimensions, Finite dimensional vector spaces, Matrix of linear transformation.

Unit II ALGEBRA

Elements of set theory, Algebera of Real and Complex numbers including De Moivere's Theorem, polynominals and polynominal Equations, Relations between Coefficients and Roots, Symmetric functions of roots.
Elements of Group Theory; Group, Subgroups, Normal subgroups, Homomorphism of groups, cyclic groups, quotient groups, permutation Groups and their elementary properties.
Rings, Integral Domains and Fields and their elementary properties.

Unit III REAL ANALYSIS

Real number system, Ordered sets, Bounds, Ordered Field, Real number system as an ordered Field with least Upper Bound, Cauchy Sequence, Completeness, Continuous Functions, Uniform Continuity, Properties of Continuous functions.

Unit IV COMPLEX ANALYSIS

Analytic function, Cauchy Riemann equations, Cauchy's integral formula, power-series, Taylor's series, Laurent's series, Singularities, Cauchy's Residue's Theorem Contour integration, conformal mapping, Billinear Transformations.

Unit V CALCULUS:

Limits, Continuity, Differentiability, Mean-value theorems, Taylor's theorem with remainders, Maxima and Minima, Asymptotes, Functions of several variables, partial derivatives, Lagrange's method of Multipliers, Jacobian, Riemann's definition of Definite integrals, indefinite integrals, infinite and improper integrals, Beta and Gamma functions.

Unit VI ORDINARY DIFFERENTIAL EQUATIONS:

Formation of differential equations, Order and Degree, Equations of first order and first degree, Integrating factor. Equations of first order but not first degree, 2nd order differential equation.

Unit VII PARTIAL DIFFEENTIAL EQUATION:

Curves and surfaces in three dimensions: Formation of partial Differential Equations : solutions of equations of type dx/P=dy/Q=dz/R; Orthogonal Trajectories, partial Differential Equations of the First order : Solution by Cauchy's method of characteristics ; Charpit's method of solution : Linear Partial Differential Equations of the second order with constant coefficients ; Equations of vibrating string ; Heat equation ; Laplace equation.

Unit VIII VECTOR ANALYSIS

Scaler and vector fields, triple products, Differentiation of Vector function of a scaler variables,. Gradient, Divergence and Curl in Cartesian, Cylindrical and Spherical coordinates and their physical interpretation, Higher order derivatives, Vector Identities and vector Equations, Application to Geometry, Gauss and Stroke's Theorems, Green's Identities

Unit IX STATICS

Equilibrium of a system of particles, work and potential energy, Friction.

Unit X DYNAMICS

Degree of freedom and constraints, Rectilinear motion, Simple Harmonic motion, Motion in a plane, projectiles, constrained Motion, work and Energy, conservation of energy.

Unit XI NUMERICAL ANALYSIS

Numerical methods : Solution of algebraic and transcendental equations of one variable by bisection, Regula –falsi and Newton – Raphson methods, Solution of system of linear equations by Gaussian elimination and Gauss – Jordan (direct) methods,Gauss (iterative) method.

Unit XII NUMERICAL INTERACTION

Simpson's one-third rule, Trapezoidal rule, Gaussian quadrature formula, Numerical solution of Ordinary Differential Equations : Euler and Runge Kutta methods.

Unit XIII PROBABILITY

Sample space, Events, Algebra of events, probability – classical, Statistical and Axiomatic Approaches, Combinatorial problems, Geometric Problems, Conditional Probability and Baye's Theorem. Random Variables and Probability. Distributions – Discrete and Continuous, Mathematical Expectations, Binomial, poisson and Normal Distributions, Joint Distribution of Random Variables, Independence.

Unit XIV STATISTICS

Concepts of population, Sample, Variable, Attribute, Parameter and Statistics, Measures of Location and Dispersion, Moments, Skewness and Kurtosis, Correlation, Simple random sampling and Sampling Distribution of sample Means and sample proportions.

COMMERCE

Accounting:

Unit -I : Nature of accounting, Accounting as information system, preparation of Income statement and Balance sheet.

Unit –II: Final accounts of non- trading organisations, statutory provisions & reserves. Human Resource Accounting.

Unit –III: Government accounting and Commercial accounting. Ratio analysis- relating to liquidity and long - term ratios.

Unit –IV: Budgeting: types of budgets, budgetary control, Zero base budgeting.

Unit –V : Management accountant and his responsibilities, Social responsibility of business.

Finance and Management:

Unit -I : Scope of financial management, profit maximization and wealth maximization, organisation of finance, finance functions.

Unit –II: Capital budgeting: Net present value, Internal rate of return , ARR, Pay Back period, capital rationing.

Unit –III: Working capital: sources , types and estimation of capital requirements.

Unit –IV: Management functions: planning, organizing, directing, levels of authority, planning strategies.

Unit –V: Organisation theories: classical, neo-classical and modern theories. Informal and formal groups.

Business Environment and Statistics:

Unit -I : Elements of business environment, environmental scanning, economic environment, Globalization, Liberalisation, Privatisation, Role of North East Council.

Unit -II: Economic Planning in India, Industrial policy of Arunachal Pradesh, World Trade Organisation.

Unit III: Probability: different approaches, types of events, Bayes theorem.

Unit IV: Theoretical distribution: binomial, normal and poisson and their implications.

Unit –V: Hypothesis: testing of hypothesis, steps involved in formulation of hypothesis. Quality control: basics, objectives and techniques and limitations.