

**FURTHER DETAILS REGARDING MAIN TOPICS OF
PROGRAMME NO. 08/2014 (Item No. 10)**

LECTURER IN STATISTICS

COLLEGIATE EDUCATION

(CATEGORY NO. 590/2012)

Module 1: Mathematical methods for statistics.

Classes of sets, sigma-algebra, measure, measurable functions and properties, Lebesgue measurable sets. Lebesgue integrals and properties. Riemann-Stieltjes' integral. Proper and improper integral, uniform convergence of series and sequences of real numbers/functions.

Linear vector space, subspace, independence of vectors, basis and dimensions. Orthogonal and orthonormal basis, Gram-Schmidt orthogonalisation, orthogonal transformations. Matrices & determinants-rank, null space, nullity, linear transformations, characteristic roots & vectors, spectral decomposition, classification & reduction of quadratic forms. Generalized inverse and properties.

Module II: Probability Theory.

Probability measure, conditional probability and Baye's theorem. Random variable-distribution, density functions and properties. Mathematical expectation and inequalities (Markov, Chebychev's, Liapounov, Jensen). Different modes of convergence of sequence of random variables, weak and strong law of large numbers. Characteristic functions-elementary properties and inverse theorem. Central limit theorems and its applications.

Module III: Distribution theory

Basic concepts in distribution theory, generating functions (pgf, mgf, cf). Bivariate distributions-joint, marginal conditional distributions and expectations. Least square principle, correlation and regression.

Standard discrete distributions (Binomial, Poisson, negative binomial, geometric, hyper geometric, power series distributions and properties). Continuous distributions (Uniform, normal, exponential, double exponential, beta, gamma, Cauchy, Weibull, Pareto, lognormal, logistic distributions, and Pearson's system of distributions.

Order statistics-joint, marginal distributions of order statistics from uniform and exponential distributions

Sampling distributions- Sample characteristics and their distributions (normal, chi square, t, F)-properties and applications.

Module IV: Sampling theory and design of experiments.

Census and sampling, probability sampling methods (SRSWR, SRSWOR, systematic, stratified, cluster, multistage samplings). PPS sampling (Des Raj's, Murthy, Horvitz-Thompson). Ratio and regression methods of estimations and properties.

Gauss-Markov set up, basic designs (CRD.RBD.LSD). Incomplete block designs- BIBID, PBIBD. Factorial experiments (2^n and 3^n) and confounding. Split plot design.

Module V: Statistical Inference

Problem of estimation, Point estimate and interval estimate-basic concepts, general properties of estimates, sufficiency and completeness-exponential family. Fisher's information, C-R inequality, Rao-Blackwell and Lehman-Scheffe theorems. Methods of estimation (MLE, Moments, Minimum Chi square). Fundamental concepts of testing of hypotheses. Neyman-Pearson lemma, most powerful test, UMP test, likelihood-ratio test, large sample and small sample tests. SPRT

Non-parametric tests (Chi square test of goodness fit, K-S test, sign test, Wilcoxon, Signed rank, run, Mann-Whitney, Wilcoxon).

Module VI: Stochastic Processes , Multivariate Analysis

Definition of stochastic process- basic concepts, Markov Chain, classification of states, discrete time branching process, Poisson process and related processes. Renewal theorem and limit theorems.

Multivariate distributions (Normal, multinomial)- marginal , conditional and characteristic functions. Distribution of quadratic forms, Partial and multiple correlations. Multivariate sampling distributions Hotelling's T^2 and Mahalanobis - D^2 .

Classification problems- Classifying to one of k multivariate normal populations, discriminant analysis, Principal component analysis, canonical variables and canonical correlations.

Module VII Recent developments in Statistics

Generalized linear modeling. Statistical decision problem, Bayesian inference, Prior and posterior distributions, Bayes' estimates, life time distributions, basic concepts of survival analysis - survival function, hazard rate. Construction and properties; various types of control charts. Acceptance sampling for attributes. Linear programming problem. Markovian Queuing models. Components of time series, ARMA and ARIMA. Basic concepts in Econometrics (demand, revenue, elasticity and equilibrium analysis). Simulation Techniques.

Module VIII Research Methodology/Teaching Aptitude

I. TEACHING APTITUDE

- Teaching: Nature, objectives, characteristics and basic requirements;
- Learner's characteristics;
- Factors affecting teaching;
- Methods of teaching;
- Teaching aids;
- Evaluation systems.

II. RESEARCH APTITUDE

- Research: Meaning, Characteristics and types;
- Steps of research;
- Methods of research;
- Research Ethics;

- Paper, article, workshop, seminar, conference and symposium;
- Thesis writing: its characteristics and format.

Module IX(a) Salient Features of Indian Constitution

Salient features of the Constitution - Preamble- Its significance and its place in the interpretation of the Constitution.

Fundamental Rights - Directive Principles of State Policy - Relation between Fundamental Rights and Directive Principles - Fundamental Duties.

Executive - Legislature - Judiciary - Both at Union and State Level. - Other Constitutional Authorities.

Centre-State Relations - Legislative - Administrative and Financial.

Services under the Union and the States.

Emergency Provisions.

Amendment Provisions of the Constitution.

Module IX (b) Social Welfare Legislations and Programmes

Social Service Legislations like Right to Information Act, Prevention of atrocities against Women & Children, Food Security Act, Environmental Acts etc. and Social Welfare Programmes like Employment Guarantee Programme, Organ and Blood Donation etc.

Module X (a) 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, AI-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, Kerala Varma Valiyakoyi Thampuran, Kandathil Varghese 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

Module X (b) General Knowledge and Current Affairs

General Knowledge and Current Affairs

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.