



# UNION PUBLIC SERVICE COMMISSION

EXAMINATION NOTICE NO.06/2019-IES/ISS

DATED : 20.03.2019

(LAST DATE FOR SUBMISSION OF APPLICATIONS : 16.04.2019)

INDIAN ECONOMIC SERVICE/**INDIAN STATISTICAL SERVICE EXAMINATION, 2019**

(COMMISSION'S WEBSITE : <http://www.upsc.gov.in>)

## IMPORTANT

### 1. CANDIDATES TO ENSURE THEIR ELIGIBILITY FOR THE EXAMINATION :

Candidates applying for the examination should ensure that they fulfill all eligibility conditions for admission to the Examination. Their admission at all the stages of the examination will be purely provisional subject to satisfying the prescribed eligibility conditions.

**Mere issue of e-Admission Certificate to the candidate will not imply that his/her candidature has been finally cleared by the Commission.**

Verification of eligibility conditions with reference to original documents is taken up only after the candidate has qualified for Interview/Personality Test.

### 2. HOW TO APPLY :

Candidates are required to apply **online** only by using the website <https://www.upsconline.nic.in> Brief instructions for filling up the online Application Form have been given in Appendix-II. Detailed instructions are available on the above mentioned website.

**2.1 Candidate should have details of one Photo ID Card viz. Aadhaar Card/Voter Card/PAN Card/Passport/Driving Licence/Any other Photo ID Card issued by the State/Central Government. The details of this Photo ID Card will have to be provided by the candidate while filling up the online application form. The candidates will have to upload a scanned copy of the Photo ID whose details have been provided in the online application by him/her. This Photo ID Card will be used for all future referencing and the candidate is advised to carry this Photo ID Card while appearing for Examination/ Personality Test.**

**2.2** The Commission has introduced the facility of withdrawal of Application for those candidates who do not want to appear for the Examination. In this regard, Instructions are mentioned in Appendix-II (B) of this Examination Notice.

### 3. LAST DATE FOR SUBMISSION AND WITHDRAWAL OF APPLICATIONS:

(I) The Online Applications can be filled up to **16<sup>th</sup> April, 2019 till 18.00 Hours.**

(II) The online Applications can be withdrawn from 23.04.2019 to 30.04.2019 till 6.00 PM. Detailed instructions regarding withdrawal of Applications is available at Appendix-II (B).

**4. The eligible candidates shall be issued an e-Admission Certificate three weeks before the commencement of the examination. The e-Admission Certificate will be made available in the UPSC website [<https://www.upsconline.nic.in>] for downloading by candidates. No Admission Certificate will be sent by post. All the applicants are required to provide valid and active E-Mail I.D. while filling up Online Application Form as the Commission may use electronic mode for contacting them.**

### 5. SPECIAL INSTRUCTIONS

Candidates are advised to read carefully "Special Instructions to the Candidates for Conventional Type Tests" (Appendix-III) and "Special Instructions for Objective Type Tests" (Appendix-IV).

### 6. INSTRUCTIONS FOR FILLING UP OMR SHEETS:

a) For both writing and marking answers in the OMR Sheets (Answer Sheet) candidates must use black ball point pen only. Pens with any other colours are prohibited. Do not use Pencil or Ink pen.

b) Candidates should note that any omission/mistake/discrepancy in encoding/filling in details in the OMR answer sheet; especially with regard to Roll Number and Test Booklet Series Code, will render the answer sheet liable for rejection.

### 7. PENALTY FOR WRONG ANSWERS (In Objective Type Question Paper):

Candidates should note that there will be penalty (**Negative Marking**) for wrong answers marked by a candidate in the Objective Type Question Paper.

### 8. FACILITATION COUNTER FOR GUIDANCE OF CANDIDATES :

2. General Studies	100	3 hrs.
3. General Economics-I	200	3 hrs.
4. General Economics-II	200	3 hrs.
5. General Economics-III	200	3 hrs.
6. Indian Economics	200	3 hrs.

**B. Indian Statistical Service**

Sl. No.	Subject	Maximum Marks	Time Allowed
1.	General English	100	3 hrs.
2.	General Studies	100	3 hrs.
3.	Statistics-I (Objective)	200	2 hrs.
4.	Statistics-II (Objective)	200	2 hrs.
5.	Statistics-III (Descriptive)	200	3 hrs.
6.	Statistics-IV (Descriptive)	200	3 hrs.

**Note-1 :** Statistics I & II will be of Objective Type Questions (80 questions with maximum marks of 200 in each paper) to be attempted in 120 minutes.

**Note-2 :** Statistics III & IV will be of Descriptive Type having Short Answer/ Small Problems Questions (50%) and Long Answer and Comprehension problem questions (50%). At least one Short Answer and One Long Answer Question from each section is compulsory. In Statistics-IV, equal number of questions i.e. 50% weightage from all the sub-sections below and candidates have to choose any two sub-sections and answer.

**Note 3 :** The papers on General English and General Studies, common to both Indian Economic Service and Indian Statistical Service will be of subjective type.

**Note 4 :** All other papers of Indian Economic Service will be of subjective type.

**Note-5 :** The details of standard and syllabi for the examination are given in Section-II below.

2. The question papers in all subjects in Indian Economic Service Examination and in Indian Statistical Service Examination will be of Conventional (essay) type except in Statistics Paper I and Statistics Paper II which are Objective Type Papers.

3. ALL QUESTION PAPERS MUST BE ANSWERED IN ENGLISH; QUESTION PAPERS WILL BE SET IN ENGLISH ONLY.

4. (i) Candidates must write the papers in their own hand. In no circumstances will they be allowed the help of a scribe to write the answers for them. The Persons with Benchmark Disabilities in the categories of blindness, locomotor disability (both arm affected – BA) and cerebral palsy will be provided the facility of scribe, if desired by the person. In case of other category of Persons with Benchmark Disabilities as defined under section 2(r) of the RPWD Act, 2016, the facility of scribe will be allowed to such candidates on production of a certificate to the effect that the person concerned has physical limitation to write, and scribe is essential to write examination on behalf, from the Chief Medical Officer/ Civil Surgeon/ Medical Superintendent of a Government Health Care institution as per proforma at Appendix – V.
- (ii) The candidates have discretion of opting for his/her own scribe or request the Commission for the same. The details of scribe i.e. whether own or the Commission's and the details of scribe in case candidates are bringing their own scribe, will be sought at the time of filling up the application form online as per proforma at Appendix - VI.
- (iii) The qualification of the Commission's scribe as well as own scribe will not be more than the minimum qualification criteria of the examination. However, the qualification of the scribe should always be matriculate or above.
- (iv) The Persons with Benchmark Disabilities in the category of blindness, locomotor disability (both arm affected – BA) and cerebral palsy will be allowed Compensatory Time of twenty minutes per hour of the examination. In case of other categories of Persons with Benchmark Disabilities, this facility will be provided on production of a certificate to the effect that the person concerned has physical limitation to write from the Chief Medical Officer/ Civil Surgeon/ Medical Superintendent of a Government Health Care institution as per proforma at Appendix – V.

**10. Inflation**—Definition, trends, estimates, consequences and remedies (control): Wholesale Price Index. Consumer Price Index: components and trends.

#### STATISTICS-I (OBJECTIVE TYPE)

**(i) Probability:**

Classical and axiomatic definitions of Probability and consequences. Law of total probability, Conditional probability, Bayes' theorem and applications. Discrete and continuous random variables. Distribution functions and their properties.

Standard discrete and continuous probability distributions - Bernoulli, Uniform, Binomial, Poisson, Geometric, Rectangular, Exponential, Normal, Cauchy, Hyper geometric, Multinomial, Laplace, Negative binomial, Beta, Gamma, Lognormal. Random vectors, Joint and marginal distributions, conditional distributions, Distributions of functions of random variables. Modes of convergences of sequences of random variables - in distribution, in probability, with probability one and in mean square. Mathematical expectation and conditional expectation. Characteristic function, moment and probability generating functions, Inversion, uniqueness and continuity theorems. Borel 0-1 law, Kolmogorov's 0-1 law. Tchebycheff's and Kolmogorov's inequalities. Laws of large numbers and central limit theorems for independent variables.

**(ii) Statistical Methods:**

Collection, compilation and presentation of data, charts, diagrams and histogram. Frequency distribution. Measures of location, dispersion, skewness and kurtosis. Bivariate and multivariate data. Association and contingency. Curve fitting and orthogonal polynomials. Bivariate normal distribution. Regression-linear, polynomial. Distribution of the correlation coefficient, Partial and multiple correlation, Intraclass correlation, Correlation ratio.

Standard errors and large sample test. Sampling distributions of sample mean, sample variance, t, chi-square and F; tests of significance based on them, Small sample tests.

Non-parametric tests-Goodness of fit, sign, median, run, Wilcoxon, Mann-Whitney, Wald-Wolfowitz and Kolmogorov-Smirnov. Order statistics-minimum, maximum, range and median. Concept of Asymptotic relative efficiency.

**(iii) Numerical Analysis:**

**Finite differences of different orders:**  $\Delta$ ,  $E$  and  $D$  operators, factorial representation of a polynomial, separation of symbols, sub-division of intervals, differences of zero.

**Concept of interpolation and extrapolation:** Newton Gregory's forward and backward interpolation formulae for equal intervals, divided differences and their properties, Newton's formula for divided difference, Lagrange's formula for unequal intervals, central difference formula due to Gauss, Sterling and Bessel, concept of error terms in interpolation formula.

**Inverse interpolation:** Different methods of inverse interpolation.

**Numerical differentiation:** Trapezoidal, Simpson's one-third and three-eighth rule and Waddles rule.

**Summation of Series:** Whose general term (i) is the first difference of a function (ii) is in geometric progression.

**Numerical solutions of differential equations:** Euler's Method, Milne's Method, Picard's Method and Runge-Kutta Method.

**(iv) Computer application and Data Processing:**

**Basics of Computer:** Operations of a computer, Different units of a computer system like central processing unit, memory unit, arithmetic and logical unit, input unit, output unit etc., Hardware including different types of input, output and peripheral devices, Software, system and application software, number systems, Operating systems, packages and utilities, Low and High level languages, Compiler, Assembler, Memory – RAM, ROM, unit of computer memory (bits, bytes etc.), Network – LAN, WAN, internet, intranet, basics of computer security, virus, antivirus, firewall, spyware, malware etc.

**Basics of Programming:** Algorithm, Flowchart, Data, Information, Database, overview of different programming languages, frontend and backend of a project, variables, control structures, arrays and their usages, functions, modules, loops, conditional statements, exceptions, debugging and related concepts.

#### STATISTICS- II (OBJECTIVE TYPE)

**(i) Linear Models:**

**Theory of linear estimation, Gauss-Markov linear models, estimable functions, error and estimation space, normal equations and least square estimators, estimation of error variance, estimation with correlated observations, properties of least square estimators, generalized inverse of a matrix and solution of normal equations, variances and covariances of least square estimators.**

One way and two-way classifications, fixed, random and mixed effects models. Analysis of variance (two-way classification only), multiple comparison tests due to Tukey, Scheffe and Student-Newmann-Keul-Duncan.

**(ii) Statistical Inference and Hypothesis Testing:**

**Characteristics of good estimator.** Estimation methods of maximum likelihood, minimum chi-square, moments and least squares. Optimal properties of maximum likelihood estimators. Minimum variance unbiased estimators. Minimum variance bound estimators. Cramer-Rao inequality. Bhattacharya bounds. Sufficient estimator. factorization theorem. Complete statistics. Rao-Blackwell theorem. Confidence interval estimation. Optimum confidence bounds. Resampling, Bootstrap and Jackknife.

**Hypothesis testing:** Simple and composite hypotheses. Two kinds of error. Critical region. Different types of critical regions and similar regions. Power function. Most powerful and uniformly most powerful tests. Neyman-Pearson fundamental lemma. Unbiased test. Randomized test. Likelihood ratio test. Wald's SPRT, OC and ASN functions. Elements of decision theory.

**(iii) Official Statistics:**

**National and International official statistical system**

Official Statistics: (a) Need, Uses, Users, Reliability, Relevance, Limitations, Transparency, its visibility (b) Compilation, Collection, Processing, Analysis and Dissemination, Agencies Involved, Methods

**National Statistical Organization:** Vision and Mission, NSSO and CSO; roles and responsibilities; Important activities, Publications etc.

**National Statistical Commission:** Need, Constitution, its role, functions etc; Legal Acts/ Provisions/ Support for Official Statistics; Important Acts

**Index Numbers:** Different Types, Need, Data Collection Mechanism, Periodicity, Agencies Involved, Uses

**Sector Wise Statistics:** Agriculture, Health, Education, Women and Child etc. Important Surveys & Census, Indicators, Agencies and Usages etc.

**National Accounts:** Definition, Basic Concepts; issues; the Strategy, Collection of Data and Release.

**Population Census:** Need, Data Collected, Periodicity, Methods of data collection, dissemination, Agencies involved.

**Misc:** Socio Economic Indicators, Gender Awareness/Statistics, Important Surveys and Censuses.

**STATISTICS- III (DESCRIPTIVE TYPE)**

**(i) Sampling Techniques:**

Concept of population and sample, need for sampling, complete enumeration versus sampling, basic concepts in sampling, sampling and Non-sampling error, Methodologies in sample surveys (questionnaires, sampling design and methods followed in field investigation) by NSSO.

Subjective or purposive sampling, probability sampling or random sampling, simple random sampling with and without replacement, estimation of population mean, population proportions and their standard errors. Stratified random sampling, proportional and optimum allocation, comparison with simple random sampling for fixed sample size. Covariance and Variance Function.

Ratio, product and regression methods of estimation, estimation of population mean, evaluation of Bias and Variance to the first order of approximation, comparison with simple random sampling.

Systematic sampling (when population size (N) is an integer multiple of sampling size (n)). Estimation of population mean and standard error of this estimate, comparison with simple random sampling.

Sampling with probability proportional to size (with and without replacement method), Des Raj and Das estimators for  $n=2$ , Horvitz-Thomson's estimator

Equal size cluster sampling: estimators of population mean and total and their standard errors, comparison of cluster sampling with SRS in terms of intra-class correlation coefficient.

Concept of multistage sampling and its application, two-stage sampling with equal number of second stage units, estimation of population mean and total. Double sampling in ratio and regression methods of estimation.

Concept of Interpenetrating sub-sampling.

**(ii) Econometrics:**

Nature of econometrics, the general linear model (GLM) and its extensions, ordinary least squares (OLS) estimation and prediction, generalized least squares (GLS) estimation and prediction, heteroscedastic disturbances, pure and mixed estimation.

Auto correlation, its consequences and tests. Theil BLUS procedure, estimation and prediction, multi-collinearity problem, its implications and tools for handling the problem, ridge regression.

Linear regression and stochastic regression, instrumental variable estimation, errors in variables, autoregressive linear regression, lagged variables, distributed lag models, estimation of lags by OLS method, Koyck's geometric lag model.

Simultaneous linear equations model and its generalization, identification problem, restrictions on structural parameters, rank and order conditions.

Estimation in simultaneous equations model, recursive systems, 2 SLS estimators, limited information estimators, k-class estimators, 3 SLS estimator, full information maximum likelihood method, prediction and simultaneous confidence intervals.

### **(iii) Applied Statistics:**

Index Numbers: Price relatives and quantity or volume relatives, Link and chain relatives composition of index numbers; Laspeyre's, Paasche's, Marshall Edgeworth and Fisher index numbers; chain base index number, tests for index number, Construction of index numbers of wholesale and consumer prices, Income distribution-Pareto and Engel curves, Concentration curve, Methods of estimating national income, Inter-sectoral flows, Inter-industry table, Role of CSO. Demand Analysis

Time Series Analysis: Economic time series, different components, illustration, additive and multiplicative models, determination of trend, seasonal and cyclical fluctuations.

Time-series as discrete parameter stochastic process, auto covariance and autocorrelation functions and their properties.

Exploratory time Series analysis, tests for trend and seasonality, exponential and moving average smoothing. Holt and Winters smoothing, forecasting based on smoothing.

Detailed study of the stationary processes: (1) moving average (MA), (2) auto regressive (AR), (3) ARMA and (4) AR integrated MA (ARIMA) models. Box-Jenkins models, choice of AR and MA periods.

Discussion (without proof) of estimation of mean, auto covariance and autocorrelation functions under large sample theory, estimation of ARIMA model parameters.

Spectral analysis of weakly stationary process, periodogram and correlogram analyses, computations based on Fourier transform.

### **STATISTICS-IV (DESCRIPTIVE TYPE)**

**(Equal number of questions i.e. 50% weightage from all the subsections below and candidates have to choose any two subsections and answer)**

#### **(i) Operations Research and Reliability:**

Definition and Scope of Operations Research: phases in Operation Research, models and their solutions, decision-making under uncertainty and risk, use of different criteria, sensitivity analysis.

Transportation and assignment problems. Bellman's principle of optimality, general formulation, computational methods and application of dynamic programming to LPP.

Decision-making in the face of competition, two-person games, pure and mixed strategies, existence of solution and uniqueness of value in zero-sum games, finding solutions in  $2 \times 2$ ,  $2 \times m$  and  $m \times n$  games.

Analytical structure of inventory problems, EOQ formula of Harris, its sensitivity analysis and extensions allowing quantity discounts and shortages. Multi-item inventory subject to constraints. Models with random demand, the static risk model. P and Q- systems with constant and random lead times.

Queuing models – specification and effectiveness measures. Steady-state solutions of M/M/1 and M/M/c models with associated distributions of queue-length and waiting time. M/G/1 queue and Pollaczek-Khinchine result.

Sequencing and scheduling problems. 2-machine n-job and 3-machine n-job problems with identical machine sequence for all jobs

Branch and Bound method for solving travelling salesman problem.

Replacement problems – Block and age replacement policies.

PERT and CPM – basic concepts. Probability of project completion.

Reliability concepts and measures, components and systems, coherent systems, reliability of coherent systems.

Life-distributions, reliability function, hazard rate, common univariate life distributions – exponential, weibull, gamma, etc. Bivariate exponential distributions. Estimation of parameters and tests in these models.

Notions of aging – IFR, IFRA, NBU, DMRL and NBUE classes and their duals. Loss of memory property of the exponential distribution.

Reliability estimation based on failure times in variously censored life-tests and in tests with replacement of failed items. Stress-strength reliability and its estimation.

**(ii) Demography and Vital Statistics:**

Sources of demographic data, census, registration, ad-hoc surveys, Hospital records, Demographic profiles of the Indian Census.

Complete life table and its main features, Uses of life table. Makehams and Gompertz curves. National life tables. UN model life tables. Abridged life tables. Stable and stationary populations. Measurement of Fertility: Crude birth rate, General fertility rate, Age specific birth rate, Total fertility rate, Gross reproduction rate, Net reproduction rate.

Measurement of Mortality: Crude death rate, Standardized death rates, Age-specific death rates, Infant Mortality rate, Death rate by cause.

Internal migration and its measurement, migration models, concept of international migration. Net migration. International and postcensal estimates. Projection method including logistic curve fitting. Decennial population census in India.

**(iii) Survival Analysis and Clinical Trial:**

Concept of time, order and random censoring, likelihood in the distributions – exponential, gamma, Weibull, lognormal, Pareto, Linear failure rate, inference for these distribution.

Life tables, failure rate, mean residual life and their elementary classes and their properties.

Estimation of survival function – actuarial estimator, Kaplan – Meier estimator, estimation under the assumption of IFR/DFR, tests of exponentiality against non-parametric classes, total time on test.

Two sample problem – Gehan test, log rank test.

Semi-parametric regression for failure rate – Cox's proportional hazards model with one and several covariates, rank test for the regression coefficient.

Competing risk model, parametric and non-parametric inference for this model.

Introduction to clinical trials: the need and ethics of clinical trials, bias and random error in clinical studies, conduct of clinical trials, overview of Phase I – IV trials, multicenter trials.

Data management: data definitions, case report forms, database design, data collection systems for good clinical practice.

Design of clinical trials: parallel vs. cross-over designs, cross-sectional vs. longitudinal designs, review of factorial designs, objectives and endpoints of clinical trials, design of Phase I trials, design of single-stage and multi-stage Phase II trials, design and monitoring of phase III trials with sequential stopping,

Reporting and analysis: analysis of categorical outcomes from Phase I – III trials, analysis of survival data from clinical trials.

**(iv) Quality Control:**

Statistical process and product control: Quality of a product, need for quality control, basic concept of process control, process capability and product control, general theory of control charts, causes of variation in quality, control limits, sub grouping summary of out of control

criteria, charts for attributes p chart, np chart, c-chart, V chart, charts for variables:  $\bar{X}$ ,  $R$ ,  $(\bar{X}, \sigma)$  charts.

Basic concepts of process monitoring and control; process capability and process optimization. General theory and review of control charts for attribute and variable data; O.C. and A.R.L. of control charts; control by gauging; moving average and exponentially weighted moving average charts; Cu-Sum charts using V-masks and decision intervals; Economic design of X-bar chart.

Acceptance sampling plans for attributes inspection; single and double sampling plans and their properties; plans for inspection by variables for one-sided and two sided specification.

**(v) Multivariate Analysis:**

Multivariate normal distribution and its properties. Random sampling from multivariate normal distribution. Maximum likelihood estimators of parameters, distribution of sample mean vector.

Wishart matrix – its distribution and properties, distribution of sample generalized variance, null and non-null distribution of multiple correlation coefficients.



Hotelling's  $T^2$  and its sampling distribution, application in test on mean vector for one and more multivariate normal population and also on equality of components of a mean vector in multivariate normal population.

Classification problem: Standards of good classification, procedure of classification based on multivariate normal distributions.

Principal components, dimension reduction, canonical variates and canonical correlation — definition, use, estimation and computation.

**(vi) Design and Analysis of Experiments:**

Analysis of variance for one way and two way classifications, Need for design of experiments, basic principle of experimental design (randomization, replication and local control), complete analysis and layout of completely randomized design, randomized block design and Latin square design, Missing plot technique. Split Plot Design and Strip Plot Design.

Factorial experiments and confounding in  $2^n$  and  $3^n$  experiments. Analysis of covariance. Analysis of non-orthogonal data. Analysis of missing data.

**(vii) Computing with C and R :**

Basics of C: Components of C language, structure of a C program, Data type, basic data types, Enumerated data types, Derived data types, variable declaration, Local, Global, Parametric variables, Assignment of Variables, Numeric, Character, Real and String constants, Arithmetic, Relation and Logical operators, Assignment operators, Increment and decrement operators, conditional operators, Bitwise operators, Type modifiers and expressions, writing and interpreting expressions, using expressions in statements. Basic input/output.

Control statements: conditional statements, if - else, nesting of if - else, else if ladder, switch statements, loops in c, for, while, do - while loops, break, continue, exit ( ), goto and label declarations, One dimensional two dimensional and multidimensional arrays. Storage classes: Automatic variables, External variables, Static variables, Scope and lifetime of declarations.

Functions: classification of functions, functions definition and declaration, assessing a function, return statement, parameter passing in functions. Pointers (concept only).

Structure: Definition and declaration; structure (initialization) comparison of structure variable; Array of structures : array within structures, structures within structures, passing structures to functions; Unions accessing a union member, union of structure, initialization of a union variable, uses of union. Introduction to linked list, linear linked list, insertion of a node in list, removal of a node from list.

Files in C: Defining and opening a file, input – output operation on a file, creating a file, reading a file.

Statistics Methods and techniques in R.

## **APPENDIX-II-**

### **INSTRUCTIONS TO THE CANDIDATES FOR FILLING ONLINE APPLICATIONS**

- Candidates are required to apply Online using the website [www.upsconline.nic.in](http://www.upsconline.nic.in).
- Salient features of the system of Online Application Form are given hereunder:
- Detailed instructions for filling up online applications are available on the above mentioned website.
- Candidates will be required to complete the Online Application Form containing two stages viz. Part-I and Part-II as per the instructions available in the above mentioned site through drop down menus.
- The candidates are required to pay a fee of Rs.200/- Rupees Two Hundred only) [excepting SC/ST/ Female/Persons with Benchmark Disability candidates who are exempted from payment of fee] either by depositing the money in any branch of State Bank of India by cash, or by using net banking facility of State Bank of India or by using any Visa/Master/RuPay Credit/ Debit

The 1<sup>st</sup> meeting of 2<sup>nd</sup> BPGS in Statistics was held on 23.02.2017 in the camber of HOD / Coordinator, Department of Statistics, Tripura University at 10.30 am. Members present:

1. Prof. M.K.Singh, Dean, Faculty of Sciences, T.U – Member / Chairman
2. Prof. A. Mukherjee, Department of Mathematics, T.U– Member
3. Dr. Prasenjit Sinha, Assistant Professor, Department of Statistics, T.U – Member
4. Mr. Samrat Hore, Assistant Professor, Department of Statistics, T.U – Member

The chairman welcomed the members. The coordinator of the department informed the members that he had sent invitations to external experts but they were not in a position to attend the meeting. Prof. D. Bhattacharyay, Department of Mathematics, Assam University had expressed his inability to attend the meeting through email. Prof. S.S.Maiti, Department of Mathematics, Visva Bharati Santiniketan had also informed coordinator over telephone. Dr. Saswata Sahoo, Chief Engineer, Advance Tech lab, Samsung R & D Institute, India has informed the coordinator that he may not act as member of BPGS due to some technical problem from his institute.

After this agenda wise discussion were initiated.

**Agendum 1: Restructuring of RAC for research scholar, Soma Rani Sutradhar under supervision of Dr. Prasenjit Sinha.**

The convener of RAC informed the members that the quorum for RAC meeting could not be materialized as two external members were not available for meeting and one of internal member, Dr. Priyaranjan Dash had left the university to join his new assignment at Utkal University. Under such situation, the convener of RAC felt difficult to do any progress in case of Smt. Soma rani Sutradhar. That is why this agenda has been brought for discussion and fruitful decision.

The matter was discussed and finally Committee resolved to restructure the RAC of Smt Soma Rani Sutradhar as given below.

OLD RAC	NEW RAC
1. Dr. Prasenjit Sinha Assistant Professor, Department of Statistics, T.U – Convener & Supervisor	1. Dr. Prasenjit Sinha Assistant Professor, Department of Statistics, T.U – Convener & Supervisor
2. Prof. Kishore K. Das. Deptt of Statistics, Guawahati University- External Member	2. Dr. Jahar Debbarma. Associate Professor, Deptt. Of Economics, T.U – Member
3. Dr. Jaha Debbarma, Associate Professor, Deptt. Of Economics, T.U – Member	3. Dr. Shyamal Debnath. Assistant Professor, Deptt. Of Mathematics, T.U – Member
4. Prof. R .N Das, Deptt. Of Statistics , University of Burdwan,- External Member	4. Dr. Souvik Bhattacharyay. Assistant Professor, Deptt. Of Mathematics, T.U –Member

*Samrat Hore*



5. Dr. Priyaranjan Dash., Deptt. Of Statistics , Assistant Professor, T.U - Member	5. Prof. R.N Das, Deptt. Of Statistics , University of Burdwan.- External Member
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**Agendum2: The application of Mr. Khokan Shil, Research Scholar, Deptt of Statistics, T.U**

The coordinator, placed the letter of Mr. Khokan Shil. He has stated in his application that he started his Ph.D work with Dr. Priyaranjan Dash but could not registered under him as he left the department to join his new assignment at Utkal University. He has requested to allot a supervisor to him.

The matter was discussed and looking the geniuses of the matter, the committee resolved that Dr. Prasenjit Sinha would be the supervisor of Mr. Khokan Shil as there was no any alternative in the department.

**Agendum3: CBCS PG. syllabus related issue (Modification in 3<sup>rd</sup> semester elective paper and introduction of new elective paper in 3<sup>rd</sup> semester).**

a) The coordinator placed the matter for discussion. Department wanted to propose modification in elective paper, STAT 906E: Operation Research. Earlier this paper was allotted 2-credits but department want to increase the credit-2 to credit-4 for this elective paper (STAT 906E). The matter was discussed and approved. This Matter would be communicated to higher body for necessary action.

b) The department also wants to introduce a new elective paper for 3<sup>rd</sup> semester course other than two available for students. The matter was discussed and the committee approved the proposal of department to introduce a third elective paper, STAT 907E: Numerical Analysis (02 credits) from the new academic session 2017-2018.

**4. Miscellaneous:**

a) Approval of RAC for Mr. Khokan Shil: Dr. Prasenjit Sinha (the allotted supervisor) submitted a proposal for formation of RAC for Mr. Khokan Shil and requested to take up the matter as the research scholar passed the pre Ph.D course work in 2014.

The matter was discussed and protecting the interest of student, the proposed RAC was approved by committee. The composition of RAC is given below.

**RAC for Khonkan Shil.**

1. Dr. Prasenjit Sinha (Deptt of Statistics, TU)- Convener & Supervisor
2. Dr. Salim Sah (Deptt of Economics, TU) - Member
3. Dr. Shyamal Debnath (Deptt of Mathematics, TU) - Member
4. Dr. Souvik Bhattacharya (Deptt of Mathematics, TU) - Member
5. Prof. R.N Das (Deptt of Statistics, Burdwan University, WB) - External Member.

*Samsat Hore*

b) List of paper setters, examiners and moderators for 2<sup>nd</sup> semester (May 2016), 1<sup>st</sup> semester (December 2016), 3<sup>rd</sup> semester (December 2016), 2<sup>nd</sup> semester (May 2017) and 4<sup>th</sup> semester (May 2017).

1. List of paper setters, examiners and moderators. for 2<sup>nd</sup> semester (May 2016) & 1<sup>st</sup> semester (December 2016) were reported and approval port facto.
2. List of paper setters, examiner and moderators for 2<sup>nd</sup> & 4<sup>th</sup> semester (May 2017) was placed in the meeting. After discussion, the list was approved by the committee with minor modification. The coordinator was requested to send the list to Controller of Examination for necessary action.

The meeting ended with a vote of thanks to the chair.

1.



**Chairman**  
**B.P.G.S.**  
**Deptt. of Statistics**  
**Tripura University**

2.



**Member**  
**B.P.G.S.**  
**Deptt. of Statistics**  
**Tripura University**

3.



**Member**  
**B.P.G.S.**  
**Deptt. of Statistics**  
**Tripura University**

4.



**Member**  
**B.P.G.S.**  
**Deptt. of Statistics**  
**Tripura University**

# SYLLABUS FOR CBCS MSc COURSE IN STATISTICS



**TRIPURA UNIVERSITY**  
(A Central University)  
Suryamaninagar, Tripura – 799022.

**2017**

*BPGS approved syllabus  
on 23.02.2017  
(1st meeting of 2nd BPGS)  
Samant Hore  
28/2/17  
Co-ordinator,  
Department of Statistics,  
Tripura University,  
Suryamaninagar-799022*



**Tripura University (A Central University)**  
**Department of Statistics**  
**Choice Based Credit System MSc Statistics Syllabus**

<b>Semester</b>	<b>Code and Name of the Core Courses (Credits)</b>	<b>Code and Elective Courses (Credits)</b>
<b>I</b>	STAT 701C (A): Measure Theory and Probability (02) STAT 701C (B): Theory of Distribution (02) STAT 702C (A): Linear Models (02) STAT 702C (B): Sample Survey (02) STAT 703C: Practical I and R Programming (04)	STAT 704E: Basic Statistics (04) STAT 705E: Mathematical Analysis (02)
<b>II</b>	STAT 801C: Statistical Inference (04) STAT 802C (A): Economic Statistics (02) STAT 802C (B): Industrial Statistics (02) STAT 803C: Practical II (04)	STAT 804E: Official Statistics (02) STAT 805E: Demography (02) STAT 806E: Research Methodology (02)
<b>III</b>	STAT 901C: Multivariate Analysis (04) STAT 902C: Design of Experiments I (02) STAT 903C: Practical III (02) STAT 904C: Project I (04)	STAT 905E: Advanced Sample Survey (02) STAT 906E: Operations Research (04) STAT 907E: Numerical Analysis (02)
<b>IV</b>	STAT 1001C (A): Stochastic Processes (02) STAT 1001C (B): Design of Experiments II (02) STAT 1002C : Reliability Theory and Survival Analysis (02) STAT 1003C: Practical IV (02) STAT 1004C: Project II (04)	STAT 1005E: Statistical Decision Theory and Bayesian Inference (02) STAT 1006E: Advanced Time Series and Econometrics (02)

Compulsory Foundation: Computer Skills II (Offered by IT and CSE Department) (04)  
 Elective Foundation: Yoga/ Song/ Play/ Sculpture/ NSS/ Communicative English (02)

**Total Credits Required for Post-Graduation in Statistics: 68 (Sixty Eight)**

1. One (01) Credit is assigned for each 25 marks and one (01) contact hour/week of teaching for theory or two (02) contact hours/week of teaching for practical/project.
2. For each course, 30 % marks are to be allotted for internal assessment.
3. All practicals in core courses are to be done using MS Excel, R, SPSS etc.
4. Practical classes for electives papers will be conducted in the theory classes. The questions for both practicals and theory will be set in the same question papers.
5. Midterm evaluation in every project by seminar.

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