MANONMANIAM SUNDARANAR UNIVERSITY, TIRUNELVELI

UG COURSES – AFFILIATED COLLEGES

B.Sc.STATISTICS

(Choice Based Credit System)

(with effect from the academic year 2017-2018 onwards)

Sem. (1)	Pt. I/II/ III/ IV/ V (2)	Sub No. (3)	Subject Status (4)	Subject Title (5)	Contract Hrs./ week (6)	C Credits (7)
I	I	1	Language	Tamil / Other Languages -I	6	4
	II	2	Language	English – I	6	4
	III	3	Core-I	Descriptive Statistics	4	4
	III	4	Core-II	Probability Theory	4	4
	III	5	Major Practical - I	Statistics Practical - I	2	2
	III	6	Allied - I	Mathematics – I	4	3
	III	7	Allied Practical – I	Statistical Computations using Software	2	2
	IV	8	Common	Environmental Studies	2	2
			Subtotal		**30**	**25**
II	I	1	Language	Tamil / Other Languages - II	6	4
	II	2	Language	English – II	6	4
	III	3	Core-III	Sampling Techniques	4	4
	III	4	Core-IV	Time Series and Official Statistics	4	4
	III	5	Major Practical - II	Statistics Practical - II	2	2
	III	6	Allied - II	Programming with C	4	3
	III	7	Allied Practical - II	Computer Practical - I	2	2
	IV	8	Common	Value Based Education ∴சமூக ஒழுக்கங்களும் பண்பாட்டு விழுமியங்களும /Social Harmony	2	2
			Subtotal		**30**	**25**
III	I	1	Language	Tamil / Other Languages – III	6	4
	II	2	Language	English – III	6	4
	III	3	Core-V	Statistical Distributions	4	4
	III	4	Major Practical - III	Statistics Practical - III	2	2
	III	5	Allied-III	Mathematical Computations using R	4	3
	III	6	Allied Practical - III	Computer Practical - II	2	2
	IV	7	Skilled Based-I	Statistical Analysis using Software - I	4	4
	IV	8	Non-Major Elective-I	Real Analysis	2	2
			Subtotal		**30**	**25**
IV	I	1	Language	Tamil / Other Languages - IV	6	4
	II	2	Language	English – IV	6	4
	III	3	Core-VI	Demographic Methods	4	4
	III	4	Major Practical - IV	Statistics Practical - IV	2	2
	III	5	Allied- IV	Matrix Theory	4	3

	III	6	Allied Practical - IV	Matrix Computations	2	2
	IV	7	Skill Based-II	Personality Development and Yoga/ Effective Communication and Yoga/ Youth Leadership and Yoga	4	4
	IV	8	Non-Major Elective-II	Mathematics - II	2	2
	V	9	Extension Activity	NCC/NSS/YRC/YWF	0	1
	Subtotal				**30**	**26**
V	III	1	Core-VII	Statistical Inference – I	5	4
	III	2	Core-VIII	Statistical Quality Control	5	4
	III	3	Major Elective-I	Elective – I (Econometrics / Stochastic Processes)	5	4
	III	4	Major Elective-II	Elective – II (Actuarial Statistics / Java Programming)	5	4
	III	5	Major Practical – V	Statistics Practical - V	3	2
	III	6	Major Practical - VI	Statistics Practical - VI	3	2
	III	7	Major Practical - VII	Statistics Practical - VII	2	2
	IV	8	Skill Based-III	Computers for Digital Era	2	2
	Subtotal				**30**	**24**
VI	III	1	Core-IX	Statistical Inference – II	6	4
	III	2	Core-X	Design of Experiments	6	4
	III	3	Core-XI	Operations Research	5	4
	III	4	Major Practical - VIII	Statistics Practical - VIII	3	4
	III	5	Major Practical - IX	Statistics Practical - IX	3	
	III	6	Major Practical - X	Statistics Practical - X	2	
	III	7	Project	Group Project	5	6
	Subtotal				**30**	**22**

Note 1:
Statistics Practical – I : Based on the subject "Descriptive Statistics" and "Probability Theory"
Statistics Practical – II : Based on the subject "Sampling Techniques" and "Time Series and Official Statistics"
Computer Practical – I : Based on the subject "Programming with C"
Statistics Practical – III : Based on the subject "Statistical Distributions"
Computer Practical – II : Based on the subject "Mathematical Computations using R"
Statistics Practical – IV : Based on the subject "Demographic Methods"
Matrix Computations : Based on the subject "Matrix Theory"
Statistics Practical – V : Based on the subject "Statistical Inference – I"
Statistics Practical – VI : Based on the subject "Statistical Quality Control"
Statistics Practical – VII : Based on the subject Elective – II (Actuarial Statistics / Java Programming)
Statistics Practical – VIII : Based on the subject "Statistical Inference – II"
Statistics Practical – IX : Based on the subject "Design of Experiments"
Statistics Practical – X : Based on the subject "Operations Research"

Note 2:
Elective – I : Econometrics Stochastic Processes
Elective – II:
        Actuarial Statistics Java Programming
Elective - III :
        Discrete Mathematics RDBMS with ORACLE)

DESCRIPTIVE STATISTICS

Unit - I

Origin, scope, limitations and misuses of Statistics – Collection - Classification-Tabulation of data. Types of Data – Nominal, ordinal, Interval and ratio. Diagrammatic presentation of data: one dimensional and two-dimensional diagrams – graphic representation: line diagram, frequency polygon, frequency curve, histogram and Ogive curves.

Unit - II

Measures of central tendency: mean, median, mode, geometric mean and harmonic mean. Partition values: Quartiles, Deciles and Percentiles. Measures of Dispersion: Mean deviation, Quartile deviation and Standard deviation – Coefficient of variation.

Unit - III

Moments - measures of Skewness - Pearson's and Bowley's Coefficients of skewness, Coefficient of Skewness based on moments – co-efficient of Kurtosis.

Unit - IV

Curve fitting: principle of least squares, fitting of the curves of the form $y = a+bx$, $y = a+bx+cx^2$ and Exponential and Growth curves.

Unit - V

Linear correlation - scatter diagram, Pearson's coefficient of correlation, computation of co-efficient of correlation from a bivariate frequency distribution, Rank correlation, Coefficient of concurrent deviation- Regression equations - properties of regression coefficients.

BOOKS FOR STUDY:
1. Anderson, T.W. and Sclove, S.L. (1978) Introduction to Statistical Analysis of data, Houghton Mifflin, Boston.
2. Bhat, B.R., Srivenkataramna, T. and Madhava Rao, K.S. (1996) statistics A Beginner's Text, Vol. I, New Age International, New Delhi.
3. Croxton, F.E. and Cowden, D.J. (1969) Applied General Statistics, Prentice Hall, New Delhi.
4. Goon, A.M., M.K. Gupta and B. Das Gupta (2002) Fundamentals of Statistics- Vol. I. World Press Ltd, Kolkata.
5. Gupta, S.C. and V.K. Kapoor (2002) Fundamentals of Mathematical Statistics, Sultan Chand & Sons, New Delhi.
6. Spiegel, M.R. and Stephens, L. (2010) Statistics, Schaum's Outline Series, Mc Graw Hill, New York.

PROBABILITY THEORY

Unit - I

Probability: sample space – Events - algebraic operations on events- definition of probability - independent events – conditional probability - addition and multiplication theorems of probability – Bayes Theorem.

Unit - II

Random variables: Discrete and continuous random variables – distribution function - properties – probability mass function and probability density function – discrete and continuous probability distributions.

Unit - III

Multiple random variables: Joint, marginal and conditional distribution functions - independence of random variables – transformation of random variables (one and two dimensional - concepts only) and their distribution functions.

Unit - IV

Mathematical expectation: Expectation – properties – Cauchy - Schwartz inequality, conditional expectation and conditional variance – theorems on expectation and conditional expectation. Moment generating function, cumulant generating function, characteristic function, probability generating function and their properties. Tchebychev's inequality

Unit - V

Limit Theorems:, convergence in probability, weak law of large numbers – Bernoulli's theorem, Khintchine's theorem (statements only) – Simple form of central limit theorem i.i.d random variables.

BOOKS FOR STUDY:

1. Goon, A.M., M. K. Gupta and B. Das Gupta (2002) Fundamentals of Statistics- Vol. I., World Press, Ltd, Kolkata.
2. Gupta, S.C. and V.K. Kapoor (2002) Fundamentals of Mathematical Statistics, Sultan Chand & Sons, New Delhi.
3. Hogg, R.V. and A. Craig (1978) Introduction to Mathematical Statistics, McMillan Publishing co., Inc.
4. Lipschutz, S. (2008) Probability Theory (Second Edition), Schaum'sOutline Series, McGraw Hill, New York.
5. Mood, A.M., F.A. Graybill and D.C. Boes (1974) Introduction to Theory of Statistics McGraw Hill Book Co.,
6. Spiegel, M.R. and Ray, M. (1980) Theory and Problems of Probability and Statistics, Schaum's Outline Series, McGraw Hill, New York.

MATHEMATICS - I

Unit - I

Tangent and Normal-Direction of the tangent-Angle of intersection of curves-subtangent and subnormal - Differential coefficient of the length of an arc of $y = f(x)$ - Polar coordinates - Angle between the radius vector and the tangent-Polar subtangent and polar subnormal - Length of arc in polar coordinates.

Unit - II

Method of finding the envelop - Curvature - Circle, radius and centre of curvature - Cartesian formulae - Evolute and Involute - Radius of curvature when the curve is given in polar coordinates.

Unit - III

Multiple integrals - Evaluation of double integrals - Double integral in polar coordinates - Triple integrals - Applications of multiple integrals.

Unit - IV

Infinite integrals - Integrand becoming infinite at certain points in the interval of integration - Beta and Gamma functions - Properties of Beta functions - Relation between Beta and Gamma functions - Evaluation of integrals using Gamma functions.

Unit - V

Differential equations: Standard types of first order and first degree equations. Variagles separable, Homogeneous, Non-homogeneous equations and Linear equation. Equations of first order but of higher degree.

BOOKS FOR STUDY:
1. Narayanan, S. and Manicavachagom Pillay, T.K. (2015) Calculus Vol. I,
   S.Viswanathan (Printers publishers) Pvt. Ltd., Chennai.
2. Narayanan, S. and Manicavachagom Pillay, T.K. (2015) Calculus Vol. III,
   S.Viswanathan (Printers publishers) Pvt. Ltd., Chennai.
3. Narayanan, S. and Manicavachagom Pillay, T.K. (2014) Calculus Vol. II,
   S.Viswanathan (Printers publishers) Pvt. Ltd., Chennai.

STATISTICAL ANALYSIS USING SOFTWARE
(The following exercise s should be carried out using software)

Unit –I
- Solving a system of equations applying Cramer's rule and Inverse of matrix.
- Fitting of linear and quadratic models.

Unit –II
- Construction of frequency table - univariate, bivariate data.
- Drawing frequency graphs.
- Construction of diagrams: Bar diagrams, Pie diagrams etc.

Unit – III
- Calculation of measures of central tendency - mean, median and mode.
- Calculation of measures of dispersion - quartile deviation, standard deviation, coefficient of variation.

Unit – IV
- Calculation of Karl Pearson's coefficient of correlation.
- Fitting of simple linear regression equation.

Unit - V
- Fitting of binomial distribution.
- Fitting of Poisson distribution.
  Fitting of normal distribution.

SAMPLING TECHNIQUES

Unit-I

Population, Census method - Need for sampling - Basic concepts of sample surveys - sampling unit - sampling frame - Principal steps involved in sample surveys - Preparation of schedules and questionnaires.

Unit-II

Sampling errors - Bias and standard errors - Mean squared error - Determination of sample size with reference to sampling errors - Non-sampling errors, Sources and types of non-sampling errors - Non-response and response errors.

Unit-III

Simple random sampling method with and without replacement (Lottery method and random number table) - estimation of population parameters - mean, variance and proportion - Simple random sampling for attributes; confidence limits - Determination of sample size.

Unit-IV

Stratified random sampling-principles of stratification - Estimation of population mean and its variance - Allocation techniques (equal allocation, proportional allocation, Neyman allocation and optimum allocation) - Estimation of gain due to stratification

Unit-V

Systematic sampling - Estimation of population mean and its variance - Comparison of simple random, stratified random and systematic sampling.

BOOKS FOR STUDY:

1. William G. Cochran (1990) Sampling Techniques (Third Edition), John Wiley Sons, New York.
2. Sampath, S. (2006) Sampling Theory and Methods (Second Edition), Narosa Publishing House, New Delhi.
3. Daroga Singh and Choudary, F.S.(1986) Theory and Analysis of Sample Survey Designs, New age International publishers, New Delhi.
4. Des Raj and Promod Chandhok (1998) Sample Survey Theory, Narosa Publishing House Pvt. Ltd, New Delhi.
5. Murthy, M.N. (1977) Sampling Theory and Statistical Methods, Statistical Publishing Society, Kolkata.

TIME SERIES and OFFICIAL STATISTICS

Unit-I (Time Series)
Concept – components of time series – additive and multiplicative models - Resolving components of a time series-measuring trend: Graphic, semi-averages, moving average and least squares methods.

Unit -II (Time Series)
Seasonal variation- measuring seasonal variation: method of simple averages, ratio-to- trend method, ratio-to-moving average method and link relative method- Cyclical and Random fluctuations- variate difference method.

Unit -III (Index Numbers)
Index numbers and their definitions - construction and uses of fixed and chain based index numbers - simple and weighted index numbers - Laspeyre's, Paasche's, Fisher's, and Marshall - Edgeworth index numbers – optimum tests for index numbers - Cost of living index numbers.

Unit -IV (Psychological Statistics)
Percentile curve and percentile ranks-their uses – combination and comparison of examination scores - Norms and scaling procedures-T and C scaling of tests - Reliability of measurements - method of measuring reliability – Internal consistency and reliability – item validity – special correlation methods.

Unit -V (Official Statistics)
Present official statistics system in India – Ministry of statistics – NSSO, CSO and their functions - Registration of vital events – National Income Statistics – Agricultural Statistics – Industrial Statistics in India – Trade Statistics in India – Labour Statistics in India – Financial Statistics in India.

BOOKS FOR STUDY:
1. Goon, A.M., M. K. Gupta and B. Das Gupta (2005) Fundamentals of Statistics- Vol. I World press Ltd, Kolkata.
2. Gupta, S.C. and V.K. Kapoor (2007) Fundamentals of Applied Statistics, Sultan Chand & Sons, New Delhi.
3. Guilford, J. P. (1986) Fundamental Statistics in Psychology and Education, McGraw-Hill Book Company, New Delhi.
4. Srivastava, S. C. and S. Srivastava (2003) Fundamentals of Statistics, Anmol Publications Pvt. Ltd., New Delhi.

PROGRAMMING with C

Unit - I

Introduction to Constants and Variables – Defining symbolic constant - Character set – Keywords and Identifiers – Declaration of Variables – Assigning values to variables – Declaring variable as a constant – Data Types.

Unit - II

Decision Making and Branching: Introduction – Decision making with IF statement – Simple IF statement – The ELSE IF Ladder – GOTO Statement - Decision Making and Looping : WHILE statement – Do Statement – FOR statement – Jumps in LOOPS.

Unit - III

Arrays: One-dimensional Arrays –Two-dimensional Arrays – Multi-dimensional Arrays – Dynamic Arrays - Handling of Character Strings: Declaring and Initializing String Variable – Arithmetic operations on Character – String handling functions.

Unit - IV

User Defined functions: Introduction – Need for User-defined function – Function calls – Function Declaration - Structures and Unions: Defining Structure – Declaring Structure variables – Structures within Structures – Union.

Unit - V

Pointers: Understanding Pointers – Declaring Pointer Variable – Accessing a variable through its Pointer – Pointer Expression - File Management in C: Defining and Opening a File – Closing a File - Input/Output operations on Files – Random access to Files.

BOOKS FOR STUDY:
1. Balagurusamy, E. (2010) Programming in ANSI C (5th Edition), Tata McGraw-Hill Education, New Delhi.
2. Ashok, M. Kamthane (2006) Programming with ANSI and Turbo C, Dorling Kindersley (India) Pvt. Ltd., New Delhi.