

APPENDIX – AE28

MANONMANIAM SUNDARANAR UNIVERSITY, TIRUNELVELI – 12.
DIRECTORATE OF DISTANCE AND CONTINUING EDUCATION
POSTGRADUATE DIPLOMA IN STATISTICAL METHODS
AND APPLICATIONS
(Effective from the Academic Year 2016-2017 onwards)

Eligibility for Admission:

Candidates who have passed graduate course / are doing postgraduate degree course with Economics / Commerce / Sociology / any branch of Science / Engineering / Technology as main subject shall be permitted to join the course and to appear and qualify for Postgraduate Diploma in Statistical Methods and their Applications Examination.

Duration of the Course:

The duration of the course is one year. Examinations will be conducted at the end of each year in respective subjects. Candidates shall complete the course as per UGC regulations.

Examination

The regulations for examination, passing minimum in each subject and classification of successful candidates are at par with the regulations for other Post Graduate Diploma Science courses offered by the University through DD&CE.

SCHEME OF EXAMINATION

| Title of the Subject | | Credit |
|----------------------|---|-----------|
| 1 | Statistical Methods | 6 |
| 2 | Applications of Probability and Distributions | 6 |
| 3 | Statistical Hypotheses Testing | 6 |
| 4 | Applied Statistical Methods | 6 |
| 5 | Statistical Practical | 6 |
| Total | | 30 |

Note 2: Candidates admitted to this course shall do the practical exercises in Statistical Practical using non-programmable scientific calculators.

1. STATISTICAL METHODS

Unit - I

Origin, scope, limitations and misuses of Statistics – Collection - Classification-Tabulation of data. Frequency Distribution – Nominal, ordinal, Interval and ratio. Diagrammatic presentation of data – 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. Measures of Skewness - Pearson's and Bowley's Coefficients of skewness, Coefficient of Skewness – co-efficient of Kurtosis.

Unit - III

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 – fitting of regression equations - properties of regression coefficients.

Unit – IV

Partial and multiple correlation co-efficients – multiple linear regression model and fitting – simple problems without derivation.

Unit – V

Sampling - Census and Sample survey - Sampling and non sampling errors - Simple random sampling - Sampling from finite populations with and without replacements. Stratified sampling, systematic sampling and cluster sampling.

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. Spiegel, M.R. and Stephens, L. (2010) Statistics, Schaum's Outline Series, Mc Graw Hill, New York.

2. APPLICATIONS OF PROBABILITY AND DISTRIBUTIONS

UNIT-I

Sample space and events - probability and probability space - Random variable - Distribution function of the random variable - discrete and continuous random variables – probability mass function and probability density function – Bivariate random variables -

marginal and conditional distributions - stochastic independence of events and random variables.

UNIT - II

Expectation of random variable and its properties – moments - conditional expectation. Moment generating function and characteristic function - inversion and uniqueness theorems.

UNIT - III

Borel-Cantelli lemma - Borel and Kolmogorov's 0-1 law. Chebyshev's and Khinchine's weak law of large numbers, strong law of large numbers and Kolmogorov's theorems – Glivenko-Cantelli theorem. Lindeberg and Levy central limit theorem (*Statement and applications only - proof not necessary*)

UNIT - IV

Discrete distributions - binomial, Poisson, Negative binomial, Geometric and multinomial distributions – truncated distributions - their properties and applications.

UNIT - V

Continuous distributions – uniform, normal, gamma, beta, Laplace, exponential, Pareto, Weibull and logistic distributions – their properties and applications. Sampling distributions – t, chi-square and F distributions. Distributions of order statistics – joint and marginal distributions of order statistics.

BOOKS FOR REFERENCE:

1. Bhat, B. R. (2007). Modern Probability Theory. (Third Edition), New Age International (P) Ltd, New Delhi.
2. Hogg, R. V., Tanis, E. A., and J.M.Rao (2005). Probability and Statistical Inference. (Seventh Edition), Pearson Education Inc.
3. Rohatgi, V. K., and A. K. Md. E. Saleh (2001). An Introduction to Probability and Statistics, (Second Edition), John Wiley and Sons, New York. (Reprint 2011)
4. Goon, A.M., M.K. Gupta and B. Das Gupta (2002) Fundamentals of Statistics- Vol. I. World Press Ltd, Kolkata.
5. Spiegel, M.R. and Stephens, L. (2010) Statistics, Schaum's Outline Series, Mc Graw Hill, New York.

3. STATISTICAL HYPOTHESES TESTING

UNIT I

Testing of hypotheses – fundamentals of hypotheses testing – simple and composite – null and alternate hypotheses – randomized and nonrandomized tests - Most powerful test – Neyman-Pearson's fundamental lemma - – uniformly most powerful tests for one-sided hypotheses - Applications to standard statistical distributions.

UNIT II

Unbiased tests – uniformly most powerful unbiased tests - Likelihood ratio test - Large sample tests – Testing significance of mean, variance and proportion – difference between means, difference between variances and difference between proportions.

UNIT III

Small sample tests for normal distributions - Test for significance of population mean - testing the equality of means and equality of variances of two normal populations - Analysis of Variance for one - way classified data - Bartlett's test for homogeneity of variances.

UNIT IV

Testing significance of correlation co-efficient, regression model, regression co-efficient.

Chi – square test – test for variance of normal population - Contingency table – co-efficient of contingency - test for association of attributes - test for goodness of fit - tests for independence.

UNIT V

Nonparametric Tests: One-sample tests - Kolmogorv-Smirnov tests - tests for randomness – runs test - sign test and Wilcoxon's signed rank test. Two-sample tests - Kolmogov-Smirnov's test - Mann-Whitney U test, median test. K-sample tests – Kruskal-Wallis test and Friedman's test.

BOOKS FOR STUDY:

1. Gibbons, J.D. and S. Chakraborti. (2010): Nonparametric Statistical Inference (Fifth Edition). Taylor & Francis, New York.
2. Goon, A.M., Gupta, M.K. and Dasgupta, B. (1989): An Outline of Statistical Theory, Vol.II. World Press, Kolkata.
3. Kale, B. K. (2005): A First Course in Parametric Inference (Second Edition). Narosa Publishing House, New Delhi. (Reprint, 2007).
4. Rohatgi, V. K. and Saleh, A.K.Md.E. (2001): An Introduction to Probability and Statistics (Second Edition). John Wiley & Sons, New York. (Reprint, 2009).
5. Spiegel, M.R. and Stephens, L. (2010) Statistics, Schaum's Outline Series, Mc Graw Hill, New York.
6. Wayne W. Daniel, (2009) Biostatistics, A foundation for Analysis in the Health Science, Wiley Series, USA.

4. APPLIED STATISTICAL METHODS

UNIT I

Basic principles of experiments – randomization, replication and local control. Size of experimental units. Basic Designs: Concept of Cochran's Theorem. Completely randomized design(CRD)- Randomized block design(RBD) - Latin square design(LSD) and their analyses - Missing plot techniques in RBD and LSD.

UNIT II

Statistical Quality Control: Quality control and need for statistical quality control techniques in industries - causes of variation - process control and product control. Process control: specifications and tolerance limits- 3σ limits, construction of Shewhart control charts - variable control charts - \bar{X} , R and σ charts- simple problems.

Control charts for attributes: control chart for fraction defectives (p chart), control chart for number of defectives (d chart) and control chart for number of defects per unit (c chart)- simple problems.

UNIT III

Time Series: Analysis of time series – decomposition of time series. Measurement of secular trend – fitting of equations, method of moving averages, variate difference method – elimination of trend and its effects. Seasonal components and methods for eliminating them - moving average method, link relative method. Cyclic components and their determination.

UNIT IV

Index numbers – calculation of indices – ratio of simple aggregates (weighted and unweighted) – average of price relatives – calculation of index numbers – Laspeyre's formula, Paasche's formula, Bowley's formula, Marshall - Edgeworth's formula and Fisher's formula - choice of period – fixed base and chain base methods.

UNIT V

Vital Statistics: Measures of mortality – crude death rate, specific death rate, infant mortality rate, fetal death rate – Measures of fertility – crude birth rate, general fertility rate, age-specific birth rate, total fertility rate. Life table and abridged life table.

BOOKS FOR REFERENCE:

1. Goon, A.M., Gupta, M K. and Dasgupta (1982). B., Fundamentals of Statistics. Vol. 2., World Press Private Ltd, Kolkata.
2. Cooray, T.M.J.A. (2008). Applied Time Series: Analysis and Forecasting. Narosa Publishing House, New Delhi.
3. Gupta, S.C. and Kapoor, V.K. (2007) fundamental OF Applied Statistics, Sultan Chand & Sons.

5. STATISTICAL PRACTICAL

Exercises based on Units –I, II and III of Paper – 1: Statistical Methods; Units-II, III, IV and V of Paper-3: Statistical Hypotheses Testing; all the Units Paper-4: Applied Statistical Methods
