10. APPLIED STATISTICS

Marks Scheme

Paper	Nomenclature	Marks	
		Science	Arts
Paper I	Statistical Inference	50 mark	65 marks
Paper II	Statistical Applications in Society and Industry	50 mark	65 marks
Paper III	Practical based on	50 mark	70 marks

Paper I, II

Total 150 200 Marks

Note: In each Question paper, 10 (ten) questions will be set having 2 (Two) from each unit. Candidates have to answer five questions in all, taking not more than one from each unit.

Paper I

Statistical Inference

Unit-I

Sampling from a distribution : Concept of statistic and its sampling distribution. Sampling distribution for mean of Binomial, Poisson and Normal Distribution. Chi-square Distribution : Definition, MGF, moments, C.G.F., Mode & Skewness and other properties (without proof). Applications. Testing Normal Population variance, Test for Goodness of fit, Contingency Table & Independence of attributes, Yate's correction.

18 hours

Unit-II

t-Distribution : Definition of Student s -t & Fisher's -t Statistic. Property and Applications of t-distribution for testing Single mean, difference of two means, observed sample correlation coefficient Paired t-test, F-Distribution : Definition, Mean, Variance & mode, Application of F distribution- Testing of equality of two variances. Relationship between t, F and chi-square Distributions (without proof)

18 hours

Unit-III

Theory of Estimation: Point Estimation- Problems for Point Estimation; Criterion of a good estimator (Unbiasedness, Consistency, Efficiency, Sufficiency). MVUE. Method of moments and Methods of Maximum likelihood. Interval Estimation- Confidence Interval for mean, variance, difference of means and ratio of variances for normal populations.

18 hours

Unit-IV

Testing of Hypothesis: Simple, Composite, Null and Alternative Hypothesis. Types of error, Critical region. BCR, Neyman-Person's Lemma (statement only) and its application. BCR in case of Binomial, Poisson, and Normal Population.

18 hours

Unit-V

Large sample test-Testing of single mean, proportion. Testing of difference of means and proportions. Non-Parametric Tests-Definition, Merits & Limitations. Sign test (for one sample and two sample cases) Run Test, Median test.

18 hours

Dr. Registrar
Academic
University of Rajasthan, Jaipur

REFERENCES

1. Goon A.M. Gupta M.K., Das Gupta B. (1991) : Fundamentals of Statistics, Vol. 1, World Press, Calcutta.
2. Hodges J.L. and Lehman E.L. (1964) : Basic Concepts of Probability and Statistics, Holden Day.
3. Mood A.M., Graybill F.A. and Boes D.C. (1974) : Introduction to the Theory of Statistics, McGraw Hill.
4. Freund J.E. (2001) : Mathematical Statistics, Prentice Hall of India.
5. Gupta S.C. & Kapoor V.K. : Fundamentals of Mathematical Statistics, Sultan Chand and Sons, New Delhi.

ADDITIONAL REFERENCES

1. Bhatt B.R. Srivenkatramana T and Rao Madhava K.S. (1997) : Statistics : A Beginner's Text, Vol. II, New Age International (P) Ltd.
2. Rohatgi V.K. (1967) : An Introduction to Probability Theory and Mathematical Statistics, John Wiley & Sons.
3. Snedecor G.W. and Cochran W.G (1967) : Statistical Methods, Iowa State University Press.
4. Dudewicz E.J. & Misra S.N. : Modern Mathematical Statistics, John Wiley and Sons.

Paper II

STATISTICAL APPLICATIONS IN SOCIETY AND INDUSTRY

(Course contents are same as that of subject statistics.)

Unit-I

Demographic Methods : Sources of demographic data census, register, adhoc survey, hospital records, demographic profiles of Indian census. Measurement of mortality-Crude death rates, Infant mortality rates, Death rate by cause, Standardized death rate. Complete life table-Construction and its main features, Mortality rate and probability of dying. Relation between different columns of life table, uses of life table and its limitations. Measurement of fertility : Crude birth rate, General fertility rate, Specific fertility rate, Total fertility rate, Gross Reproduction Rate, Net Reproduction Rate. 18 hours

Unit-II

Economic Statistics : Index numbers-Definition, Applications of index numbers, Price relatives, Quantity & Value relatives, Link and Chain Relatives. Problems involved in computation of index number. Use of averages, Simple aggregative and Weighted average

Dr. Registrar
Academic
University of Rajasthan Jaipur

methods. Laspeyre's Paasche's and Fisher's index number. Tests for index numbers. Consumer price index. 18 hours.

Unit-III

Time Series Analysis: Definition and its different components, illustrations, additive and multiplicative models. Different Methods for determination of trend & seasonal fluctuation along with their merits & demerits. 18 hours

Unit-IV

Educational Statistics: Methods of standardization of scales and tests, Z-scores, t-scores, Standard scores, Percentile score, Intelligence Quotient and its measurement and uses, Validity of test scores. Reliability of Test Scores and their determination. 18 hours

Unit-V

Statistical Quality Control: Concept of SQC, Process control & Product control. Causes of variation in quality, General theory of control charts, control limits, sub-grouping, Summary of out-of control criteria. Control charts for variables: Construction of Mean and Range charts. Concept of Defects and Defectives. Control Charts for attributes: Construction of np-chart, p-chart, c-chart and their merits and Semerits 18 hours

REFERENCES:

1. Croxton F.E. Gowden D.J. (1969): Applied General Statistics, Prentice Hall of India.
2. Duncan A.J. (1974): Quality Control and Industrial Statistics, Taraporewala and Sons.
3. Goon A.M. Gupta M.K. Das Gupta B. (1986): Fundamentals of Statistics, Vol.II, World Press, Calcutta.
4. Grant E.L. (1964): Statistical Quality Control, Mc Graw Hill.
5. Guilford J.P. & Fruchter B: Fundamental Statistics in Psychology and Education (1980). Mc Graw Hill.
6. Guilford J.P. (1954): Psychometric Method. Mc Graw Hill.
7. Srtivatava O.S. (1983): A Textbook of Demography, Vikas Publishing.
8. Gupta S.C. & Kapoor V.K.: Fundamentals of Applied Statistics, Sultan Chand and Sons., New Delhi.

ADDITIONAL REFERENCES:

1. Freeman Frank S. (1962): Psychological Testing, Oxford & IBH Publishing Co.

Dr. Registrar
Academic
University of Rajasthan, Jaipur

2. Gupta and Mukhopadhyay P.P : Applied Statistics, Central Book Agency.
3. Pressat R(1978): Statistical Demography, Methuen and Co. Ltd.

PAPER III
Practical Paper

(Course contents are same as that of subject statistics.)

1. Tests of significance based on t, Chi-square, F. Testing of significance of sample correlation coefficient mation.
2. Large sample tests for means and proportions. Tests of goodness of fit and independence of attributes in contingency tables.
3. Non-parametric tests: Sign, Run, Median (for large samples)
4. Computation of mortality and fertility rates. Construction of life table.
5. Construction of Index Numbers by Laspeyre's, Paasche's, Fisher's, Chain Base Indices. Consumer price index.
6. Tests for Index numbers.
7. Determination of trend in a time series and construction of seasonal indices.
8. Drawing of $\overline{X}$, R, np, p and C-Charts.

Dr. Registrar
Academic
Univer... ...aja than, Jaipur