VISHWAKARMA UNIVERSITY
Maximising Human Potential

Syllabus for Ph.D. (Statistics) Entrance Exam Paper -II

UNIT-1	Probability & Distribution theory

Probability theory, measure theory, Borel-contelli Lemma, Tchebycheff's and Kolmogorov's inequalities, Various modes of convergence: in probability, almost sure, in distribution and in mean square and their inter- relationship.
Binomial, Poisson, Geometric, Normal, Exponential, Beta and Gamma distributions. Sampling distributions; Student-t distribution, F-distribution and Chi-square distribution.

UNIT-2	Statistical Inference

Properties of a good estimator, Concept of likelihood function, Cramer-Rao inequality, Bhattacharya Bounds, Minimum mean square estimation, Rao-Black well theorem. Simple tests based on t, f, Chi-square and normal variate z.

UNIT-3	Sampling Theory

Probability sampling. Sampling with equal and unequal probabilities: pps sampling with replacement and without replacement sampling. Stratified sampling. Proportional allocation, optimum allocation, Cluster Sampling, Two Stage Sampling, Double Sampling

UNIT-4	Models & Regression

Linear & non-linear model, Test of Linear Hypothesis: One way and two-way classifications. Fixed, random and mixed effect models (two way classifications only), variance components, Linear Regression: Bivariate, Multiple regression and use of orthogonal polynomials, Prediction, Residual analysis, PRESS statistic, Lack of fit, Model Building: Model building problem, Variable selection, Stepwise regression methods, Lift curve, KS statistic, Cross validation, Applications, Polynomial Regression.

UNIT-5	Multivariate Analysis

Multivariate normal distribution Marginal and Conditional distributions. Estimation of the mean vector and covariance matrix, maximum likelihood estimator of the parameters of multivariate normal distribution. The distribution of the sample mean vector and sample dispersion matrix. Hotteling's T^2 and Mahalanobis-D^2 Statistic; distribution and uses. Principal components and Canonical correlation in the population.

References:

1. Kingman, J F C & Taylor. S.J. (1966). :Introduction to Measure and Probability. :Cambridge University Press.
2. Bhat, B.R. :Modern Probability Theory, Wiley, Eastern
3. Kendall and Stuart : Advanced Theory of Statistics Vol.-II
4. Cochran W.G. : Sampling Techniques (3rd Edition, 1977), Wiley.
5. Des Raj and Chandak (1988) : Sampling Theory, Narosa.
6. Das M.N. and Giri N (1979) : Design and Analysis of Experiments, Wiley Eastern.
7. Anderson T.W. (1983) : An Introduction of Multivariate Statistical analysis, second Edition John Wiley.
8. Das, M.N. Giri N. (1979) : Design and Analysis of experiments, Wiley Eastern.

9.	Kapur, J.N. Sexena, H.C.	: Mathematical Statistics & S. Chand & Co.
10.	Goon, A.M., Gupta, M.K. VIand Dasgupta, B.	: Fundamental of Statistics, Vol.II ed. word Press Calcutta 1988