1**. Name of the Course:** Probability & Statistics

2. **Code:** PAS

2. **LTP structure of the course:** 3-1-0

3. **Objective of the course:** This course provides an elementary introduction to probability and statistics with applications. The topics covered in this course are basic concept of probability and statistics, random variables, probability distributions, Bayesian inference, joint probability distributions, random vectors, central limit theorem, confidence intervals.

4. **Outcome of the course:** The topics covered in this course would be very much useful for the B. Tech. to develop basic understanding of the subject. This course would also provide the students the background required to apply the basic concepts of probability and statistics in handling large data, analyzing noise in a system and studying stochastic processes.

5. **Course Plan:**

Component	Unit	Topics for Coverage
Component 1	Unit 1	Probability: Axiomatic definition, Properties, Conditional probability, Bayes rule and independence of events, Random Variables, Distribution function.
	Unit 2	Discrete and Continuous random variables, Expectation, Function of random variable, Moments, Moment generating function, Chebyshev's and Morkov's inequality. Bernoulli, Binomial, Geometric, Negative binomial, Hypergeometric, Poisson, Discrete uniform, Continuous uniform, Exponential, Gamma, Normal.
Component 2	Unit 3	Random vector: Joint distributions, Marginal and conditional distributions, Moments, Independence of random variables, Covariance, Correlation, Functions of random variables, Law of Large Numbers: Weak and Strong law of large numbers.
	Unit 4	Levy's Central limit theorem (independently and identically distributed with finite variance case), Normal approximation to Binomial and Poisson, Statistics: Introduction: Population, Sample, Parameters, Point Estimation: Method of moments, Maximum likelihood estimation, Unbiasedness, Consistency, Interval Estimation: Confidence interval, Tests of Hypotheses, Regression Analysis.

6. **Text Book:**

1. Sheldon M. Ross, An Introduction to Probability Models, 10th Edition, Academic Press, Elsevier.

2. Sheldon M. Ross, An Introduction to Probability and Statistics for Engineers and Scientists, 3rd Edition, Academic Press, Elsevier.

7. **References Books:** 1. Rohatgi, V. K. and Saleh, A. K. (2000), *An Introduction to Probability and Statistics*, 2nd Edition, Wiley-interscience.

2. Bertsekas, D. P. and Tsitsiklis, J. N. (2008), *Introduction to Probability*, Athena Scientific, Massachusetts.

3. Montgomery, D. C., Peck, E. A. and Vining, G. G. (2012), *An Introduction to Linear Regression Analysis*, 5th Edition, Wiley.