**Madan Mohan Malaviya University of Technology Gorakhpur**

**SUBJECT: Digital Communication (BEC-301) ECE-VTH SEM**

**ASSIGNMENT -2**

**Q.1** Define with example (1) Experiment (2) Sample Space (3) Event (4) Probability

**Q.2** Write short notes on the following:

1. Gaussian Distribution

(ii) Central limit theorem

**Q.3** Let X(t) be a white Gaussian noise with **SX(f) =N0/2**. Assume that X(t) is input to an LTI system with

**h(t)=e−tu(t).**

Let Y(t) be the output.

1. Find SY(f).
2. Find RY(τ).

(iii) Find E[Y(t)2]

**Q.4** Define cumulative distribution function (CDF) and also explain the properties of cumulative distribution function.

**Q.5** Define mean or average or expected value of a random variable.

**Q.6** A continuous random variable has a probability density function (PDF) expressed as fX(x) =2e-2x for x>0. Determine the probability that it will take a value between 1 and 3.

**Q.7** Explain probability density functions (PDF)? How do we get PDF from Cumulative distribution function (CDF)?

**Q.8** Define random variables and differentiate between discrete and continuous random variable with proper examples.

**Q.9** Define random process and classify random process with examples.

**Q.10** Explain Auto-corelation function (ACF) with physical significance and also explain the properties of ACF.

**Q.11** Consider a random process X(t) is given by X(t)=Acos(2πfct +ϴ) where ϴ is uniformly distributed between 0 and 2π.Find the Auto-corelation Function.

**Q.12** Explain power spectral density (PSD) and also explain properties of power spectral density.

**Q.13** The probability density function (PDF) of a continuous random variables is of the form fX(x) = (½)e-|x| for -∞<x<∞. Determine the mean of the random variables.

**Q.14** Consider a random variable X uniformly distributed between 0 and 2π. Calculate (1) mean value (2) mean square value (3) variance (4) expectation of cosX.

**Q.15** A stationary random process X(t) has a ACF given by RX(Г) = 20 +5cos2Г +10e-4Г calculate (1) DC power (2) AC power (3) total avg power (4) mean (5)variance (6) RMS value of random process.