LAGOS CITY POLYTECHNIC, IKEJA
SCHOOL OF ENGINEERING AND APPLIED SCIENCE
DEPARTMENT OF COMPUTER SCIENCE
2015/2016 SEMESTER EXAMINATION

COURSE TITLE: STATISTICAL THEORY I **NO OF QUESTIONS: 6**
COURSE CODE: STA 311 **TIME ALLOWED: 2 HRS**
FOR WHOM: HND YR I CS PT **INSTRUCTIONS: ANSWER ANY FOUR QUESTIONS**

1. (a) Distinguish between
   (i) Discrete and Continuous variables
   (ii) Probability Mass Function and Probability Density Function

   (b) Let x be a discrete random variable following a Poisson Distribution with parameter λ. Obtain
   (i) The probability mass function of x
   (ii) Mean of x
   (iii) Variance of x

2. (a) Define the following:
   (i) Mathematical expectation of Random Variables
   (ii) Variance of a random variable

   (b) (i) Lists properties of expectation of a Discrete Random Variable.
   (ii) Show that
   (a) $Et(x) = tE(x)$
   (b) $E(x + t) = E(x) + t$

3. (a) Find the following:
   (i) $\int x^n \, dx$ (ii) $\int (2x^2 + 3x + 8) \, dx$

   (b) If X is a continuous random variable with probability density function

$$f(x) = \begin{cases} \frac{kx}{8} & 0<x<4 \\ 0 & \text{elsewhere} \end{cases}$$

   find the constant k.

4. A continuous random variable has a probability density function

$$f(x) = \begin{cases} 3e^{-2x} \, 2e^{-x} & x \geq 0 \\ 0 & \text{elsewhere} \end{cases}$$

   find p(0<x< [ ])k.

5. (a) Define the moment generating function of a random variable.

   (b) Show that the p.d. f of $\bar{X} = \frac{1}{n}\sum X_i$ where $x_i, x_2 \ldots x_n$ and $N(\mu, \sigma^2)$ is $N\left[\mu, \frac{\sigma^2}{n}\right]$

6. States the properties of the Normal Distribution.

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