DEPARTMENT COMPUTER SCIENCE & I.T
BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY- BSC IT09S

SMA 2230 - PROBABILITY AND STATISTICS II

<u>Instructions</u>
Answer question ONE and any other two questions

1. a) Define the following terms
            i)   Random variable
            ii)   Discrete random variable
            iii)   Continuous random variable
            iv)   Probability mass function
            v)   Probability density function   (15 marks)

    b) A coin is tossed 4 times. Derive the probability mass function, the
        expectation and the variance.   (15 marks)

2.   Find the moment generating function (mgf), the mean and variance of a
        Poisson distribution.   (20 marks)

3. a) A random variable X has the density function f(x)=x2 (0≤x≤1). If the
        variable Y is the area of a circle, radius X. Find the mean value of Y and
        its density function.   (10 marks)

    b) There are 5 white and 45 black mables in an urn. If 10 marbles are drawn
        without replacement, what is the probability that 2, 3, or 4 of the ten are
        white?   (10 marks)

4.   A Poisson distribution is defined as

            f(x) = $\underline{\lambda^x e^{-\lambda}}$ r=0,1,2,3,…
                    x!

        Prove that the mean and variance is λ.   (20 marks)

5. a) An athlete finds that in the high jump, he can clear a height of 1.68m once
        in five attempts and a heght of 1.52 nine times out of ten attempts.
        Assuming the heights he can clear in various jumps form a normal
        distribution, estimate the mean and standard deviation of the distribution.
                                                          (10
        marks)

    b) Explain the following terms as used in hypothesis testing
            i)   Type I and Type II errors

ii)   One tailed and Two tailed tests

iii)   Null hypothesis and Alternative hypothesis   (10 marks)