THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

(A Constituent College of JKUAT)

Faculty of Engineering and Technology

DEPARTMENT OF COMPUTER SCIENCE & INFORMATION TECHNOLOGY

UNIVERSITY EXAMINATION FOR DEGREE IN
BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY (BSc. I.T. 9S)
(YR III, SEM II)

SMA 2230: PROBABILITY & STATISTICS II

END OF SEMESTER II EXAMINATION

SERIES: DECEMBER 2011

TIME: 2 HOURS

Instructions to Candidates:
You should have the following for this examination
- *Answer Booklet*

This paper consist of **FIVE** questions in **TWO** sections **A** & **B**
Answer question **ONE (COMPULSORY)** and any other **TWO** questions
Maximum marks for each part of a question are as shown
This paper consists of **TWO** printed pages

SECTION A (*Compulsory*)

Question One (30 Marks)

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)

SECTION B (*Attempt any TWO questions*)

Question Two (20 Marks)

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

Question Three (20 Marks)

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)

Question Four (20 Marks)

A Poisson distribution is defined as

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

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

Question Five (20 Marks)

a) An athlete finds that in the high jump, he can clear a height of 1.68m once in five attempts and a height 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)