# Mount Kenya University

UNIVERSITY EXAMINATIONS 2014/15
**SCHOOL OF PURE AND APPLIED SCIENCES**

**DEPARTMENT OF MATHEMATICS**

**UNIT CODE: BMA 2102: PROBABILITY AND STATISTICS II**

**AUGUST 2015 SERIES SCHOOL BASED CAT I DUE**

Instructions: Answer all questions

1. The discrete variable X is such that P(X =x) =c 'the number on a biased die', and the p.d.f. of X is shown,

| X | 1 | 2. | 3. | 4. | 5. | 6. |
|---|---|---|---|---|---|---|
| P(X = x) | $\frac{1}{6}$ | $\frac{1}{6}$ | $\frac{1}{5}$ | y. | $\frac{1}{5}$ | $\frac{1}{6}$ |

Find

a) The value of y, 2marks
b) The expectation of X 2marks
c) Standard deviation of X 3marks
d) Var(4X) 1marks
e) Find moment generating function 2marks

2. Brian is playing a board game in which he needs to throw a six with an ordinary die in order to start the game. Find the probability that

a) Exactly four attempts are needed to obtain a six 2marks
b) At least two attempts are needed, 2marks
c) He is successful in throwing a six in three or fewer attempts, 2marks
d) He needs more than three attempts to obtain a six 2marks
e) If X is a random variable with probability p of a successful throw a six to commence the game. Find the mean and Variance of the distribution. 4marks
f) Hence or otherwise obtain moment generating function 3marks

3. Obtain the moment generating function for the distribution $f(r) = \begin{cases} \frac{e^{-m}m^r}{r!}, 0,1,2..... \\ 0, otherwise \end{cases}$

Hence or otherwise find the third moment about the mean 5marks

4. The mass, Xkg, of a particular substance produced in one hour in a chemical process is moselled by a continuous random variable with p.d.f given by f(x)

$$= \begin{cases} 0, x < 0 \\ \frac{3}{32}x^2, 0 \le x < 2 \\ \frac{3(6-x)}{32}, 2 \le x \le 6 \\ 0, x > 6 \end{cases}$$

a) sketch the graph of the function f — 2marks

b) P( x < 4) — 3marks

c) Find the variance — 5marks