TAKORADI POLYTECHNIC
SCHOOL OF APPLIED SCIENCE
DEPARTMENT OF MATHEMATICS AND STATISTICS
END OF FIRST SEMESTER EXAMINATION
2015/2016 ACADEMIC YEAR

JANUARY2016 PROBABILTY 1
STA 115 TIME:3 HOURS

ANSWER ALL QUESTIONS IN SECTION "A" AND TWO QUESTIONS IN SECTION "B"

SECTION A [40marks]

Answer all questions in this section

1. (a) Let A be the set of real numbers that satisfy the following equation $2x = 10$. Describe A by:
   i. The roster method
   ii. The property method

   (b) Let U={1,2,3,4,5,6,7,8,9,10}.
   A= {1, 2, 3, 4, 5, 6}
   B= {4, 5, 6, 7}
   C= {2, 4, 6, 8, 10}.

   Find
   i. AUB
   ii. $(A \cap B)^c$
   iii. $(A^c \cap B)$

   11marks

2. Find the number of different ways in which the letters of the following words can be arranged;
   i. STATISTICS
   ii. PEPPER
   iii. POSSIBLE

   9marks

3. Without using a calculator, find the values of:
   (a) ${}^{8}P_{5}$
   (b) ${}_{8}P_{3}$
   (c) ${}^{10}P_{10}$

   9marks

4. (a) A lady has 8 house plants. In how many ways can she arrange 6 of them on a line on a window sill?

(b) In how many ways can 3 boys and 3 girls sit in a row if:

(i) All of them can sit anywhere?

(ii) The boys and girls are each to sit together?

(iii) Only boys must sit together?

(iv) No two people of the same sex are allowed to sit together? *11marks*

Section B (60marks)

Answer two questions only from this section. All questions carry equal marks

5. (a) A committee of 6 is to be formed from 13 men and 7 women. In how many ways can the committee be selected given that:

(i) It must consist of 4 men and 2 women?

(ii) It must have at least one member of each sex?

(b) In how many ways can

(i) 3 representatives be selected from 20 students?

(ii) 11 players be chosen from 12 footballers?

(c) A school basketball squad for the inter-school competition has ten players. The coach must select a team for the first tournament. How many teams of five players can be constituted?

20marks

6. (a) Evaluate:

(i) $\binom{7}{4}$

(ii) $\binom{50}{46}$

(iii) $\binom{9}{0}$

(b) The Revered Minister of Presbyterian Church of Ghana always insist that every member of the Church shakes hands with every other member exactly once. On one particular Sunday, ninety members were present in the Church. How many handshakes occurred?

(c) If A and B are disjoint events and $P(A) = 0.3$ and $P(B) = 0.6$ calculate:

i. $P(A \cup B)$

ii. $P(\overline{A} \cap B)$

iii. $P(\overline{A} \cup \overline{B})$ *30marks*

7.

(a) A box contains 40 identical bulbs of which 10 are red, 25 are black and 5 white. A ball is selected at random from the box. What is the probability that it is:

(i) Red or black

(ii) Red or white
(iii) Black or white

(b) A box contains 8 bulbs, of which 5 are good and 3 are defective. If 3 bulbs are randomly taken from the box, what is the probability that all are good?

(c) Two balls are selected at random without replacement from a box which contains 4 white and 8 black balls. Compute the probability that:

(i) Both balls are white.
(ii) The second ball is white.

30marks