# Uganda Advanced Certificate of Education

# APPLIED MATHEMATICS

# P 425/2

# TIME: 3 HOURS

Instructions;

- Attempt all the eight questions in Section A and five from section B.
- All working must be clearly shown.
- Clearly indicate the questions attempted.
- Begin each answer on a fresh sheet of paper
- Graph paper is provided
- Silent, non-programmable calculators may be used

## SECTION A

1. Two events A and B are such that P(A) = $\frac{1}{5}$ and P (B ) = $\frac{1}{2}$
   Find P (AuB) when A and B are:
   a) Independent event, (b) mutually exclusive
2. The table below shows the values of two variables P and Q

| P | 14 | 15 | 25 | 20 | 15 | 7 |
|---|---|---|---|---|---|---|
| Q | 30 | 25 | 20 | 18 | 15 | 22 |

   Calculate the rank correlation coefficient between the two variables.
3. Events A and B are such that P(AnB) = $\frac{1}{12}$ and P ($^{A}/_{B}$) = $\frac{1}{3}$
   Find P (BnA$^{1}$).
4. Events A and B are independent such that P(A)=0.4, P(AuB)=0.7. find;
   i) P(B)
   ii) P(AnB)
   iii) P($A^{1}nB$)
5. A bag contains 5 Pepsi Cola and 4 Mirinda bottle tops. Three bottle tops are picked at random from the bag one after the other without replacement. Find the probability that the bottle tops picked are of the same type.
6. A box A contains 1 white ball and 1 blue ball. Box B contains only 2 white balls. If a ball is picked at random, find the probability that it is;
   ( 05 marks )
   i) White
   ii) From box A given that it is white
7. Two events A and B are such that P ($^{A}/_{B}$)= $^{2}/_{5}$ , P (B ) =$^{1}/_{4}$ and P ( A ) = $^{1}/_{5}$
   Find:
   i) P (A n B) (02 marks)
   ii) P (A ∪ B) (03 marks)
8. The table below shows number of boys in a certain school

| Mass | 15 | 20 | 25 | 30 | 35 |
|---|---|---|---|---|---|
| Number of boys | 5 | 6 | 10 | 20 | 9 |

   Calculate the mean mass.

## SECTION B

9. (a) A bag contains 30 white (W), 20 blue (B) and 20 red (R) balls. Three balls are drawn at random one after the other without replacement.

Determine the probability that the first ball is white and the third ball is also white. (05 marks )

(b) Events A and B are such that P(A) =$\frac{4}{7}$ ,P(A n $B^1$) = $\frac{1}{3}$ and P ($^A/_B$) = $\frac{5}{14}$ .Find;

i. P(B)

ii. P ($A^1$n$B^1$) (07 marks)

10. Two events A and B are such that P($B$) = $\frac{1}{8}$, P(A n B) = $\frac{1}{10}$ and P($B/A$) = $\frac{1}{3}$

Determine the;

i) P (A) (03 marks)

ii) P (A U B) ( 03 marks)

iii) P($^A/_{\bar{B}}$) (06 marks)

11. The table below shows marks obtained by 100 students in a mathematics test.

| marks | Number of students |
|---|---|
| 20-<40 | 5 |
| 40-<50 | 15 |
| 50-<55 | 10 |
| 55-<60 | 15 |
| 60-<70 | 25 |
| 70-<80 | 25 |
| 90-<100 | 5 |

a) Calculate the mean mark

b) Draw a cumulative frequency curve and use it to find the;

i) Median mark

ii) Range of the middle 40% of the marks

12. A certain football team has three matches to play. The probabilities of winning the first, second and third matches are$\frac{3}{5}, \frac{2}{5}$ $and$ $\frac{1}{5}$ $respectively.$

a) Find the probability that the team wins;

i) Exactly two matches

ii) All matches

iii) No match (7 marks)

b) Two events A and B are such that P(A)=0.7, P(AnB)=0.45 and P($A^1nB^1$) = 0.18.

Find;

i) P($B^1$)

ii) P(A or B)

13. A survey of mass in kg of girls in Tosmic school of excellence was taken and results are shown below.

| Mass (kg) | Number of girls |
|---|---|
| 40-45 | 3 |
| 45-50 | 9 |
| 50-55 | 16 |
| 55-60 | 21 |
| 60-65 | 17 |
| 65-70 | 14 |
| 70-75 | 5 |
| 75-80 | 7 |
| 80-85 | 4 |
| 85-90 | 1 |

a) Calculate the;
   i) Mean
   ii) Standard deviation of the masses (07 marks)

b) Draw a histogram and use it to estimate the modal mass (5 marks)

14. Observe the table below.

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Number of errors (x) | 12 | 24 | 20 | 10 | 32 | 30 | 28 | 15 | 18 | 40 | 27 | 35 |
| Speed (y) in seconds | 130 | 136 | 124 | 120 | 153 | 160 | 155 | 142 | 145 | 172 | 140 | 157 |

i) Calculate the coefficient of rank correlation by spearman
ii) Comment on your results
iii) Plot the above data on a scatter diagram and draw a line of best fit through the points of a scatter diagram

15. A box contains 3 red sweets, 8 blue sweets and 7 green sweets. Three sweets are randomly drawn one after another without replacement. Using a probability tree diagram, Find the probability that;
   i) All sweets are blue
   ii) All sweets are red
   iii) One of each color

16. On a certain day, fresh fish from lakes, Kyoga, Victoria, Albert and George were supplied to market in ratio 30%, 40%, 20% and 10% respectively.

Each lake had an estimated ratio of poisoned fish of 2%, 3%, 3% and 1% respectively. If a health inspector picked a fish at random;

i) What is the probability that the fish was poisoned

ii) Given that the fish was poisoned, what is the probability that it was from Lake Albert.