



Scott Christian UNIVERSITY

SCHOOL OF PROFESSIONAL STUDIES

CERTIFICATE IN AGRIBUSINESS

UNIT CODE/NAME: CAG 102: BUSINESS MATHEMATICS

September- December 2019/2020 End Semester Exam

- Time: 2 Hours

Instructions: Answer Question ONE (Compulsory) and any other TWO questions.

QUESTION ONE

- a) If $U = \{x: x \leq 11, x \in \mathbb{N}\}$ is the universal set and $K = \{2, 3, 6, 8\}$, $L = \{3, 5, 6, 7\}$, $M = \{4, 9, 11\}$ are subsets find:
- i) $K \cup L \cup M$ ii) $K \cap L^c$ iii) $P(M) = 2^M$, the power set of M (5 Marks)
 - ii) There are 25 students in a class and they study either Mathematics or Physics or both Mathematics and Physics. Let M be the set of students studying Mathematics and P the set of students who study Physics. Given that $n(M) = 12$ and $n(P) = 17$, Find $n(M \cap P)$. (3 Marks)
- b) Solve the following simultaneous equations by Cramer's rule:
- $$\begin{aligned} 6x + 7y &= 29 \\ 9x - 3y &= -24 \end{aligned}$$
- (4 Marks)
- c) The first term of an arithmetic progression is 11. If the 17th term exceeds the 12th term by 35, find the common difference and the sum of the first forty terms. (4 Marks)
- d) A business man deposits Kshs.800,750 in a bank at the beginning of every year. If the money earns compound interest at the rate of 11% p.a. How much money does he have at the bank at the end of the third year? (4 Marks)
- e) Use the quadratic formula to solve the quadratic equation:
- $$9y^2 - 6y - 15 = 0$$
- (4 Marks)
- f) The fifth term of a geometric progression is 27. If the third term is 243, find the first term and the common ratio. (3 Marks)
- g) Write short notes on the importance of Business math in business and industry. (3 Marks)

QUESTION TWO

- a) Write short notes on the following terms as used in financial mathematics.
- i. Compound Interest. (2 Marks)
 - ii. Depreciation. (2 Marks)
 - iii. Appreciation. (2 Marks)
- b) An asset is valued at Kshs 640,000. It appreciates at the rate of 12% per annum. Find its value in 10 years' time. (3 Marks)
- c) The value of a car now is £ 5820 depreciates due to wear at tear in 5 years to a value worth £ 2640. Find the rate of depreciation using:
- i) The straight-line method. (3 Marks)
 - ii) The balance method (3 Marks)

QUESTION THREE

- a) Describe each of the following terms as used in set theory.
- Set. (1 Mark)
 - Complement of a set. (1 Mark)
 - Infinite set (1 Mark)
- b) Safaricom (Kenya Ltd) surveyed 400 of its customers to determine the way they learned about the new *Jibambie* tariff. The survey shows that 180 learned about the tariff from radio, 190 from television, 190 from newspapers, 80 from radio and television, 90 from radio and newspapers, 50 from television and newspapers, and 30 from all three forms of media.
- Draw a Venn diagram to represent this information Using your Venn diagram (together with the Inclusion-Exclusion Principle where need be), determine: (3 Marks)
 - The number of customers who learned of the tariff from at least two of the three media. (2 Marks)
 - The number of customers who learned of the tariff from exactly one of the three. (2 Marks)
 - The number of customers who did not learn of the tariff any of the three media. (2 Marks)
- c) Describe any three applications of set theory in business and industry. (3 Marks)

QUESTION FOUR

- a) A bag contains four yellow pencils and five green pencils. Two pencils are drawn at random one after the other without replacement.
- Draw a tree diagram to show all the possible outcomes and write in the probabilities on the branches. Use it to find the probability that: (3 Marks)
 - Two yellow pencils are obtained. (2 Marks)
 - Two balls are of different colors. (3 Marks)
- b) Given that:

$$X = \begin{bmatrix} 3 & 11 & 6 \\ 9 & -3 & 8 \\ 5 & 0 & 9 \end{bmatrix} \quad Y = \begin{bmatrix} 1 & 2 & 0 \\ 0 & -4 & 5 \\ 5 & -8 & 7 \end{bmatrix} \quad \text{Find:}$$

- $X + Y$ (2 Marks)
- $X - Y$ (2 Marks)
- XY (3 Marks)

QUESTION FIVE

- a) If \$ 6000 is invested for 5 years at 9 % p.a compounded semiannually how much interest is earned? (3 Marks)
- b) Given the sequence $6, 4, \frac{8}{3}, \dots$ Find the sum of the first 8 terms. Hence deduce the sum to infinity of the corresponding series. (5 Marks)
- c) The data below shows the masses of babies in kilograms who attended a medical checkup in a certain clinic.

Mass (Kg)	5 – 9	10 – 14	15 – 19	20 – 24	25 – 29	30 – 34	35 – 40
No. of babies.	8	12	17	14	11	5	3

Estimate:

- The median mass (3 Marks)
- The mean mass (4 Marks)