MBARARA UNIVERSITY OF SCIENCE AND TECHNOLOGY

FACULTY OF COMPUTING AND INFORMATICS

MID SEMESTER EXAMINATIONS

Course Code : MTH 1111
Course Name : DISCRETE MATHEMATICS
Course Year : BCS/BSE YEAR 1
Date : 26/10/2021
Duration : 1 HOUR
Time : 11:00 am-12:00 Noon

Instructions: Do all numbers.

(a) Given that the universal set $U=\{1,2,3,4,5,6,7,8,9,10\}$, $A=\{2,4,6,8,10\}$, and $B=\{1,3,5,7,9,10\}$, find;

(i) $(A \cup B)^1$ (2 marks)

(ii) $(B-A)^1$ (2 marks)

(iii) $(A \cap B)^1$ (2 marks)

(b) Write the following in set-builder form; D={-3, -6, -9, -12}. (2 marks)

(c) (i) Define a power set. (2 marks)

(ii) Write the power set of the following set: $B=\{y: y \in N \text{ and } 1 \leq y \leq 3\}$. (2 marks)

(d) Using examples explain the following in relation to sets;

(i) relative complement of sets (2 marks)

(ii) symmetric difference of sets (2 marks)

(e) prove that for any two sets A and B, $(A \cup B)' = A' \cap B'$

(f) Explain the following types of relations;

(i) a binary relation (2 marks) A = B

(ii) symmetric relation (2 marks)

(iii) Transitive relation (2 marks)

(g) If R is a relation from N to N defined by $R = \{(x, y) : 4x + y = 12, x, y \in N\}$ find the domain and the range of R (2 marks)

(h) Using examples explain the following terms in mathematical logic:

(i) A proposition. (2 marks)

(ii) A primitive proposition (2 marks)

(j) Construct truth table for the following statement:

$(p \wedge \neg q) \rightarrow p$ (4 marks)

(k) Explain the following as applied in graph theory

(i) multiple edges (2 marks)

(ii) degree of a vertex (2 marks)

(iii) complete gragh (2 marks)

(iv) complement of a graph (2 marks)

END