BIT 111

28TH OCT 2022

a) Use Venn diagrams to show that the following argument is valid: (5 Marks)

S_1: *All my friends are musicians*

S_2: *John is my friend.*

S_3: *None of my neighbours are musicians.*

S: *John is not my neighbour.*

b) Prove that $1 + 2 + 2^2 + 2^3 + \cdots + 2^n = 2^{n+1} - 1$. (5 Marks)

c) Draw the truth table for $(p \rightarrow q) \rightarrow r$. (4 Marks)

d) Find x and y if $(x + 3,3) = (5,3x + y)$. (3 Marks)

e) Prove that if x is an odd integer then x^2 is also odd using direct proof. (5 Marks)

f) Find the power set of $A = \{1,2,3,4\}$ and use it to verify that $|P(A)| = 2^{|A|}$. (4 Marks)

c) A class contains 10 students with 6 men and 4 women. Find the number n of ways the class:

i) Select a 4 member committee from the students (2 Marks)

ii) Select a 4-member committee with 2 men and 2 women. (2 Marks)

Discrete