There are three switches, named P, Q, and R, in a machine designed to play as a musical instrument. These switches are in, either "ON" or "OFF" status. On and Off states are logically expressed by 1 and 2 respectively.instrument creates sound when Q switch is on and at least one other switch is on.

i. Construct a truth table to represent the above scenario.

ii. Write the Sum of Product expression for above truth table.

iii. Simplify above boolean expression by using Karnaugh map.

iv. Construct a logic gate circuit for the simplified boolean expression you get in section (iii).