GU TECH, Al Ghazali University
SUBJECT: CS103 – DISCRETE STRUCUTRES
QUIZ#01 (FALL 2024)
SOLUTION PAPER - A

Date: 11-11-2024   *Max Marks: 02*   *Duration: 15 minutes*

Note: Attempt question on question paper. All questions carry equal marks.

Roll#:_____   Student Signature:_____

Q1): Let *p* and *q* be the propositions

  p: I bought a train ticket this week.

  q: I got the chance to travel to Lahore.

Express the following propositions as s a single, clear English sentence that captures the meaning of this expression.

$\neg p \lor (p \land q)$

Sol:

Either I did not buy a train ticket this week, or I bought a train ticket and got the chance to travel to Lahore.
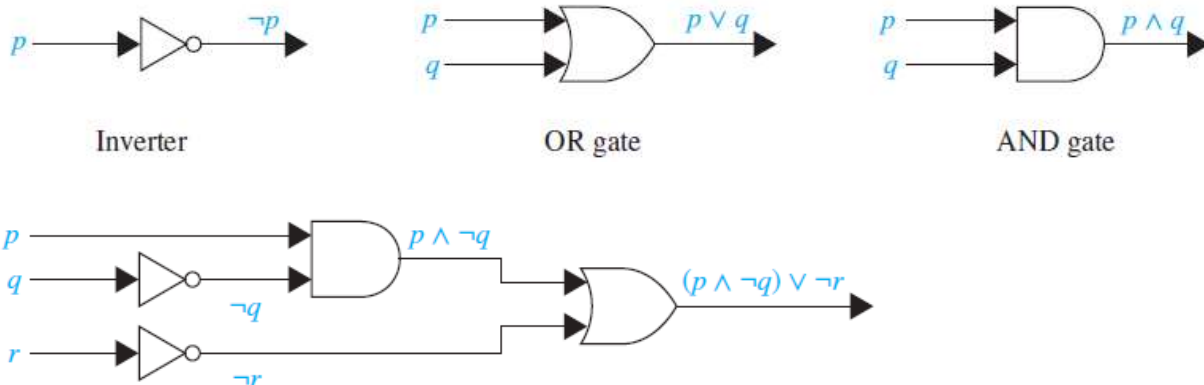
Q2): Say whether each of the following expression is a syntactically legal sentence of Propositional Logic:
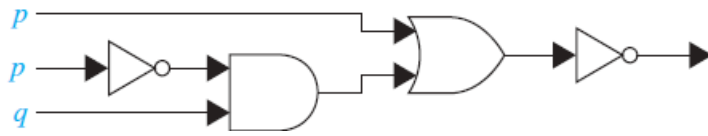
$p \land \neg p$

Sol:

yes

Q3): Consider these three basic gates to build more complicated circuits, such as that shown in Figure and its equivalent propositional expression:

Inverter   OR gate   AND gate

Now give the expression for the following circuit:

Sol:
¬ (p ∨ (¬p∧ q))

Q4). How can this English sentence be translated into a logical expression?

"You cannot ride the roller coaster if you are under 4 feet tall unless you are older than 16 years old."

Sol:
Let q, r, and s represent "You can ride the roller coaster," "You are under 4 feet tall," and "You are older than 16 years old," respectively. Then the sentence can be translated to

$(r \wedge \neg s) \rightarrow \neg q.$

QUIZ#01 (FALL 2024)
SOLUTION PAPER - B
Date: 11-11-2024   *Max Marks: 02*   *Duration: 15 minutes*

Note: Attempt question on question paper. All questions carry equal marks.

Roll#:_____   Student Signature:_____

Q1): Let p and q be the propositions "The election is decided" and "The votes have been counted," respectively.

Express the following propositions as s a single, clear English sentence that captures the meaning of this expression.

¬q ∨ (¬p ∧ q)

Sol:
Either the votes have not been counted, or the election is not decided even though the votes have been counted.

Q2): Say whether each of the following expression is a syntactically legal sentence of Propositional Logic:

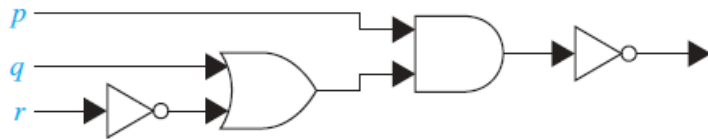$p \vee \neg q \wedge \neg p \vee \neg q \Rightarrow p \vee q$

sol:
yes

Q3): Consider these three basic gates to build more complicated circuits, such as that shown in Figure and its equivalent propositional expression:

Inverter   OR gate   AND gate
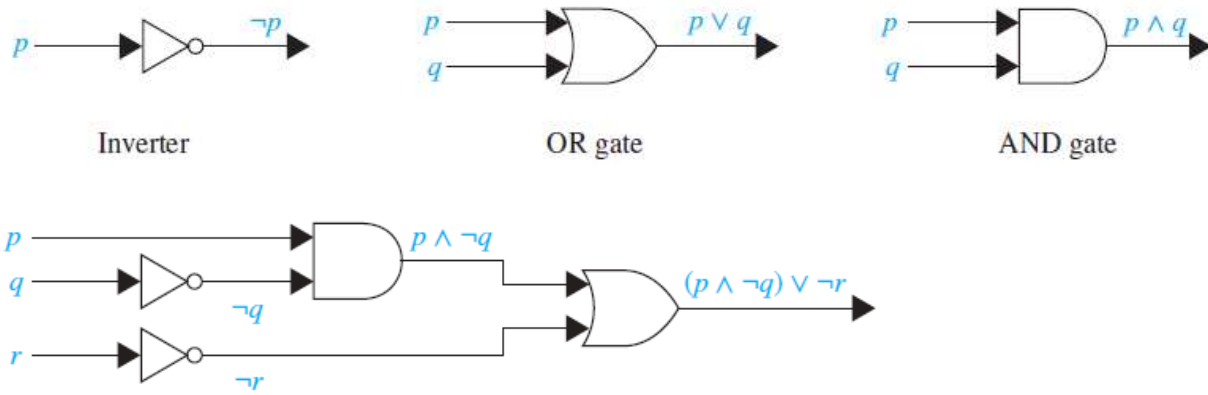
Now give the expression for the following circuit:

Sol:
$\neg (p \wedge (q \vee \neg r))$

Q4). How can this English sentence be translated into a logical expression?

"You can access the Internet from campus only if you are a computer science major or you are not a freshman."

Sol:
let a, c, and f represent "You can access the Internet from campus," "You are a computer science major," and "You are a freshman," respectively. Then the sentence can be translated to

$a \rightarrow (c \vee \neg f)$

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SUBJECT: CS103 – DISCRETE STRUCUTRES
QUIZ#01 (FALL 2024)
SOLUTION PAPER - C

Date: 11-11-2024   *Max Marks: 02*   *Duration: 15 minutes*

Note: Attempt question on question paper. All questions carry equal marks.

Roll#:_____   Student Signature:_____

Q1): Let p, q, and r be the propositions

       p: You have the flu.
       q: You miss the final examination.
       r: You pass the course.

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Express the following propositions as s a single, clear English sentence that captures the meaning of this expression:

$(p \land q) \lor (\neg q \land r)$

Sol:
Either you have the flu and miss the final examination, or you do not miss the final examination and you pass the course.
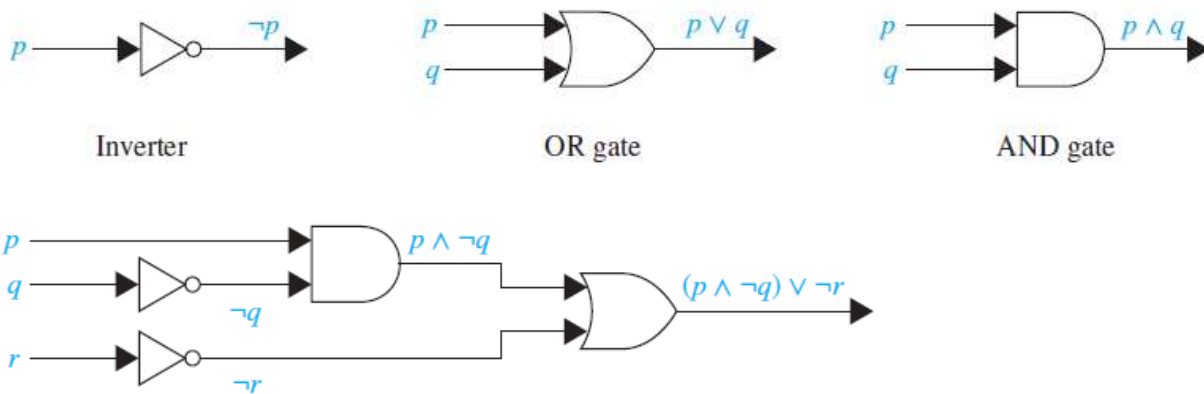
Q2): Say whether each of the following expression is a syntactically legal sentence of Propositional Logic:
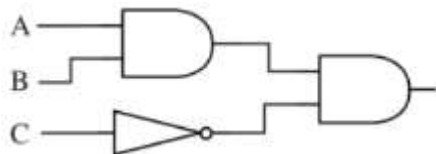
$\neg\neg p$

sol:
yes

Q3): Consider these three basic gates to build more complicated circuits, such as that shown in Figure and its equivalent propositional expression:

Inverter   OR gate   AND gate

Now give the expression for the following circuit:

Sol:
$(A \land B) \land \neg C$

Q4). How can this English sentence be translated into a logical expression?
"You can get the ticket if you are under 5 feet tall unless you are older than 16 years old."

Sol:
Let q, r, and s represent "You can get the ticket," "You are under 4 feet tall," and "You are older than 16 years old," respectively. Then the sentence can be translated to

$(r \land \neg s) \to q$