SOLUTION

Remark for RUBRIC

It is not required to show all the columns in the truth table. For B – 3 columns minimum.

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MTH210 – SUBMISSION_20221124

TIME: 15 minutes MARKS: 5

No consultation – open notes – **books and internet not allowed.** Marks will depend on the correctness and completeness of your answer.

For each of the following compound propositions, state whether it is a tautology, contradiction, or contingency, ***with justification***:

(A) $(p \leftrightarrow q) \leftrightarrow ((p \wedge \neg q) \vee (\neg p \wedge q))$

(B) $(p \wedge \neg q) \rightarrow (q \rightarrow p)$

ID: NAME: GROUP:

For A, 5 columns minimum.

CUT : 0.5 marks if less. (for each part)

ANS: We construct truth tables for each of these compound propositions to determine the answer.

B) $(p \wedge \neg q) \rightarrow (q \rightarrow p)$

p	q	$p \wedge \neg q$	$q \rightarrow p$	Proposition B
T	T	F	T	T
T	F	T	T	T
F	T	F	F	T
F	F	F	T	T

(PTO)

B) Continued

Since the truth value is T in all cases, the proposition (B) is a TAUTOLOGY

A) $(p \leftrightarrow q) \leftrightarrow ((p \wedge \neg q) \vee (\neg p \wedge q))$

p	q	$p \leftrightarrow q$	$p \wedge \neg q$	$\neg p \wedge q$	$(p \wedge \neg q) \vee (\neg p \wedge q)$	A
T	T	T	F	F	F	F
T	F	F	T	F	T	F
F	T	F	F	T	T	F
F	F	T	F	F	F	F

Since the truth value is F in all cases, the proposition is a CONTRADICTION

RUBRIC

For each part → 1 mark for correct answer
→ 1.5 marks for a fully correct truth table
(0 if one or more rows have an incorrect entry)